Western Transition

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Western Transition

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Western Transition

READER'S NOTE

The reader should note that various conventional symbols similar to those used by Statistics Canada have been used in the tables:

-- amount too small to be expressed
. . figures not available
. . . figures not appropriate or not applicable
- nil or zero
e estimated figures
x data confidential, to meet the secrecy requirements of the Statistics Act.

Details may not add up to totals because of rounding.

1 Problems and Prospects

In this report we examine the long-term economic prospects for the western provinces of Canada: Manitoba, Saskatchewan, Alberta, and British Columbia. We are optimistic about those prospects. Admittedly, the expectations generated by the 1960s and 1970s were perhaps overly high, but the gloom of the early 1980s is equally misplaced. Future growth will likely be strong absolutely and reasonable compared with that in the rest of Canada, though weak compared with the headier boom times of the 1970s.

But nothing is certain. Our view requires the implementation of appropriate policies, notably for forestry management, transportation improvements, oil and gas development, grain marketing, mineral development, manufacturing promotion, and, most importantly, for the vast and growing service sector.

Our optimism also requires that no unusually adverse external events occur. That is not unreasonable. We assume no future depression like that of the 1930s, though not the absence of recessions; indeed, some could even be as severe as the one from which we are just emerging. We assume no major downward drift in the real price of natural resource exports such as grains; coal, oil, and gas; other minerals; and forest products. Nor do we assume particularly favourable developments in prices. Western success requires only the absence of catastrophe, not fortuitous bonanzas. We also assume no trade wars, for barriers to exports would have serious effects on the West. Moreover, a move towards protection of our manufacturing industry could reduce our demand for imports and the flow of Canadian dollars to foreigners, which would in turn undermine the demand for our exports – and ultimately western prosperity.

Somewhat more controversially, our optimism is aiso based on our judgment that an increase in the production of goods and services that do not enter international or interprovincial trade will stimulate growth significantly. The developments in the service sector will be important for both creating jobs and raising real per capita income levels; manufacturing will contribute to a minor extent. One result will be the continuation of a trend already under way towards decreasing the degree of dependence on natural resources. The West will consequently be less vulnerable to uncontrollable changes in production and markets.

What we are saying is that, although natural resources will continue to be a major driving force behind western growth, the West may no longer need to rely so exclusively on these resources to sustain solid economic growth; it will probably become decreasingly reliant on them over the next generation. Diversification, as normally understood, is unlikely, however, since the West will probably never become a major area for the manufacturing of finished goods. But there will be a partial achievement of two of the main ends for which diversification has always been sought: the vulnerability of the western provinces to falling prices associated with rising productivity will decline; and their exposure to externally imposed economic shocks resulting from the volatility of world resource prices will be diminished. How great a reduction in vulnerability could be expected is impossible to determine, but the favourable direction of change seems clear.

We expect all provinces to share in good growth. In British Columbia we judge that appropriate policies and what we regard as reasonably likely price developments will overcome problems in the forestry industry and encourage growth in the province. Alberta will experience much slower growth than in the past but will still grow quite strongly. Saskatchewan will almost maintain its recent favourable growth path. Manitoba's growth is perhaps the hardest to anticipate, but the evidence favours slightly better growth than has most recently been the lot of this province.

This report is designed to elaborate upon the reasons for our optimistic views, to analyse the western provincial economies, and to describe the policies that we believe are needed to justify our confidence in the future of the West. Optimism does not imply a lack of problems, only belief in their resolution. We begin, therefore, with a look at just what problems the western provinces confront.

Many will actually think it rather odd to talk of western "problems." The West is perceived as prosperous by westerners and others alike – an economic winner. Certainly Manitoba has fared less well than the other western provinces; nor has the recession left the West unscathed. Still, in the last two decades aggregate income and population growth have been considerably better in much of the West than in the rest of Canada. And, as we shall see,

according to many of the conventional indicators of economic performance the West has done well. What then are the "problems" of western Canada?

Perhaps the greatest problem is the westerners' perpetual concern about their role as "hewers of wood and drawers of water." Many in the West think that the area's specialization in natural resources is risky for the long term, regardless of the prosperity that it brings in the short and medium terms. That prosperity is seen to be highly irregular, waxing and waning every few years as international market conditions and internal production levels vary. Some other observers view growth as a natural progression from export-based primary production to primary manufacturing, to full-fledged industrialization. For them, to continue to specialize in primary products is to stunt growth, which will ultimately lead to impoverishment of the region. Others in the West claim that any disadvantages resulting from resource specialization are more than offset by the benefits derived, but they probably constitute a minority. Thus widespread uneasiness persists that western development is not balanced. This anxiety can be not just unpleasant in the short run but very dangerous in the long run. Tennyson, in speaking of the eventual effect of unfaithfulness on love, could just as well have been commenting on the long-run implications of unbalanced growth for western prosperity:

> It is the little rift within the lute,
> That by and by will make the music mute.

This primal worry about hewing wood and drawing water is at bottom a concern about the insecurity of growth, especially in the long haul, and about the lack of diversification, which is closely related, but not identical, to insecurity of growth. There are other issues too. Many of them are rooted in concern about whether westerners receive economic justice within Confederation. In addition, individual provinces in the West face many specific difficulties. At this point we do not wish to judge whether all western concerns would bear close scrutiny. That is part of our task in the chapters that follow. Here we simply recognize that the existence of western concerns is a problem in itself and devote the rest of this chapter to exploring the nature of those concerns.

Insecurity of Growth and Lack of Diversification

Despite substantial economic differences among the western provinces, the region as a whole is more specialized in natural resources and more export-oriented than central Canada. Such specialization brings significantly higher real living standards to both westerners and nonwesterners alike. Yet westerners argue that because the sales and prices of natural resources are more volatile than those of manufactures, they pay a cost that other Canadians do not, in the form of greater-than-average fluctuations in western economic life. They cite the more severe effects of the Great Depression on the West and the aftermath of the 1972-73 upsurge in commodity prices as examples of the busts and booms in their history.

High sensitivity to world economic demand is not the only source of instability. Areas that specialize in only a few natural resources – forest products and fish in British Columbia, hydrocarbons in Alberta, grains and potash in Saskatchewan, and grains in Manitoba – are especially vulnerable, because considerable changes in supply and demand for particular resources can occur even when world economic conditions in general are quite stable. For example, the relative price of a natural resource can fall steeply if crops elsewhere are abundant or if a cartel collapses, or it can rise just as dramatically if crops elsewhere fail or a cartel is successful. In either case, western revenues will be whipsawed. Similarly, domestic crops can fail or be abundant, and this can have a destabilizing effect on revenues. Such irregularities in net returns are superimposed on the broader swings caused by ups and downs in the world business cycle.

In addition to cyclical and short-term instability, the West may also face long-term insecurity. Growth in jobs and population may not be permanently sustainable; the population could even contract someday. The belief is that growth in the West is not dependable over the long run, because resources provide an insecure economic base. Some resources – conventional oil, as a leading example – will become exhausted at present or foreseeable prices in a few years or decades. Grain prices have fallen gradually since 1914. And there is concern about deterioration in the quality of the soil and the availability of water, both of which are so important for the West's renewable resources. These changes make it harder to sustain rates of growth in incomes and employment that are comparable to those in other areas.

The counterpart of the West's specialization in resources is its relative dearth of manufacturing industries and the lack of diversification in the western economy. The West imports many of its manufactures from central Canada or from abroad, and its industrial structure reflects this fact. To the extent that manufactured products are less subject than natural resources to instability, irregularity, and long-term insecurity of output and demand (although some would doubt that nowadays) and are free of risks like soil erosion and resource exhaustion, an economy with a less-than-average proportion of manufacturing and a higher dependence on resources is subject to a

greater-than-average degree of economic insecurity. From this point of view, lack of diversification is just another way of describing the problems of resource-linked insecurity of growth.

But worries about specialization and the absence of diversification go beyond concern over greater exposure to risk. They also point to a lack of adequate variety in the job opportunities available. Dependence on natural resources affects the kinds of jobs available, which are believed to be more limited and limiting than those in central Canada where economic activity is more diversified.

Two aspects of this problem may be distinguished. First, at the upper level of the occupational scale, westerners are concerned that some specialized occupations are not represented at all, while the scope is limited for others, so that full advancement in a particular field is not possible without temporary or permanent migration to central Canada. Second, at the middle and lower levels, the occupational opportunities available, being linked more to natural resources and the land and less to industrial and factory work, are seen by some as less desirable. The degree of satisfaction attainable from the jobs available, their prestige in the eyes of society, and their income levels are all found to be wanting. In particular, employees in agriculture – though not necessarily employers or the self-employed – have often been lower paid and had fewer fringe benefits than employees in other industries.

Thus the bias of the western economic structure towards resources and away from the manufacturing industry creates concern that fewer "good jobs" exist and that income will be distributed less equitably than elsewhere. One especially important problem is that of the native peoples, who are more heavily represented in proportion to the population in the West than elsewhere and who are poor. Their chance of overcoming poverty is lower, it is believed, partly because good jobs are thought to be scarce in an economy with such a weak manufacturing base.

Economic Justice within Confederation

Individuals in every Canadian province have dual loyalties – to their province and to their nation. People in Alberta think of themselves as both Canadians and Albertans; in Manitoba they are both Canadians and Manitobans; and so on across all the provinces. This dual sense of identity leads legitimately to the question of whether each province gets a "fair deal" from the Canadian Confederation: Does it get its fair share of the economic benefits? Does it get any share at all, or perhaps even a negative one? Traditionally, doubts in the West about whether it gets a fair deal from Confederation focus on five areas: trade and tariff policy; transportation policy; federal government expenditures and revenues, with special emphasis on revenues from resources; the nature of federal decision making; and the location of private economic power in central Canada. Each of these questions deserves examination.

For trade and tariffs, the reasons for the long-standing policy of protection are well understood and accepted in the West. The need to develop an economically independent nation and the use of the tariff to do so have been taken for granted there as much as anywhere else. Westerners contend, however, that they pay for this policy through higher prices for manufactured goods and other imports, while they receive few or none of the benefits of jobs or industrial diversification.

Transportation, and especially railway transportation, is an important issue for westerners. Since the passage of the National Transportation Act in 1967, railway freight rates have been largely set at what the traffic will bear, the mandated low grain rates being the only significant exception. Because there is little competition from other transportation modes on the Prairies, though not in British Columbia, westerners argue that they bear a higher-than-average proportion of the fixed costs of rail operation, to the detriment of their living standards. Moreover, the detailed structure of freight rates – including, though not restricted to, the Crow rates – is considered by many westerners to discourage diversification in the West, especially in the Prairie provinces.

The question of the equity of government spending is also long-standing. Federal expenditures may be usefully separated into transfers and expenditures for goods and services. The West often sees itself as losing out on transfers, though experience differs by province. Westerners also believe that much government activity is footloose in principle, so that it can be economically located anywhere; yet, in practice, only a low percentage of federal government jobs end up in the West, which appears to them to be unfair. On the revenue side, despite the retention of significant natural resource revenues, large amounts go into the federal coffers. Westerners believe that federal policies that determine how much of the natural resource revenues should go to them have discriminated against western resources and continue to do so. They cite the contrast between the treatment of oil and hydro-electricity rents in the energy field as an example of such discrimination.

What these complaints all add up to is a notion among many westerners, notably in the far West, that they pay more of the costs of federalism and receive fewer of the benefits, in proportion to their population

and income, than do central Canadians. Although many of the differences stem from their relatively greater economic prosperity, not all of them are considered equitable. Moreover, since westerners view their prosperity as insecure in the long term, they believe that some of the benefits of prosperous times should be used to guard against the uncertain future. This is hard for them to do if all the benefits are absorbed by the rest of the country as soon as they appear.

But federal government responsibilities transcend spending and collecting revenues. In the areas of administration, regulation, and other framework policies, westerners claim their concerns are rarely given fair weight. They cite federal policies on transportation, on energy regulation, on exports of minerals, natural gas, and other resources, and on regulation of foreign investment as instances where the interests of central Canada are systematically and unfairly put ahead of those of the West.

Westerners also complain of the practices of the private sector. The head offices of many private companies, including banks and most financial institutions, are located in central Canada. As a consequence, both major and minor decisions affecting westerners are made outside the West by people who are thought to lack full understanding of the advantages of doing business in the West. Westerners argue that the allocation of capital is then biased against the West in favour of central Canada. Thus western development and diversification are deemed to be hampered by the central Canadian focus of key decision makers in private institutions, with financial institutions often being held especially culpable.

By and large, these problems concern all westerners. A number of significant problems, however, are unique to certain parts of the West.

Specific Provincial Concerns

Mention has already been made of the doubts expressed in British Columbia about the long-run reliability of forestry as an engine of growth. Until now it has been possible to sustain the growth of forest products by depleting virgin timber, but with virgin forests disappearing that process is seen as coming to an end. The feared effect of what is referred to as the "falldown" phenomenon is a slowdown, or even cessation, of the historical growth rate in that industry. To the extent that overall B.C. economic prosperity in the past required growth in the forestry and forestry-related industries, this phenomenon would lead to a slowdown in overall growth, if not cessation.

The problem is exacerbated by other factors as well. Forest land is being diverted to other uses, such as urban development and parks. Price developments for wood in international markets are unpredictable; thus we do not know whether prices will be favourable enough to stimulate the industry or whether they will be unfavourable and aggravate existing problems. Uncertainty also surrounds the extent to which the rate of productivity improvement in the forestry can be increased so as to offset the fall-down phenomenon, either partially or wholly. And ever present is the concern about attitudes in the United States towards customs duties and other barriers to trade in Canadian forest products.

This exposition of the forestry-associated concerns in British Columbia is by no means complete, but it should be sufficient to show that there are grounds for anxiety. Nor are forestry concerns the only ones in this province: coal marketing and transportation, the development of ports, and unemployment rates, which are usually higher than the national average, especially during recessions, are just a few other issues.

Albertans are equally concerned with the future prospects for their major natural resource – namely, oil and gas. The rate of discovery of new conventional oil resources has fallen, and exploration is becoming more costly. Current estimates suggest that these unfavourable developments will continue. Nor are tertiary recovery and oil sands plants, given present world price trends, expected to do more than replace a fraction of the growth that was previously created by conventional oil. With gas, availability is not seen as an immediate problem, though there is some question about reserves over the very long term; instead, the issue is marketability. How rapidly can demand from the United States grow, and at what price? Other problems also exist, including the determination of how long reasonably rapid agricultural growth can be sustained. The Heritage Fund is official recognition that prosperity based mainly on an exhaustible resource is inevitably tenuous. Thus a major provincial concern is how to take maximum advantage of the already waning hydrocarbon-based prosperity to make the transition to a healthier economy with the promise of long-term sustainable growth.

Incomes in Saskatchewan have historically been significantly more unstable than elsewhere. Having always been the least diversified province in the West, of late the range of natural resources being exploited has been widened to include a greater variety of grains and additional resources, such as oil and gas, potash, and uranium. Also, explicit policy attempts have been made to increase manufacturing in the province. Since many of Saskatchewan's resources are renewable or, if nonrenewable, rather plentiful (oil and gas excepted), people in that

province are more concerned than the average person with decreasing the volatility of economic activity, and they are slightly less concerned with whether the prosperity stemming from resource exploitation will be sustainable in the long run.

Manitoba is seen by many in the province, and elsewhere, as an auxiliary supplier of manufactures and key services to the other Prairie provinces; thus its prosperity is thought to be rather closely linked to the fortunes of Saskatchewan and Alberta. The prospects for grains and livestock are another important determinant of prosperity in Manitoba; but, as will be seen in our later discussion of agriculture, nothing much can be done about those from inside the province. Consequently, concern in Manitoba focuses mostly on how to strengthen its position as a Prairie supplier of manufactures and services and conceivably on how to export manufactures and services beyond that area. That would inject an element of dynamism into a province that, unlike the rest of the West, has not experienced any significant burgeoning of activity for decades, despite its being the most diversified of the three Prairie provinces.

This chapter is not, nor was it intended to be, a complete province-by-province rundown of all matters of economic concern. For example, little has been said about the important matters of human resources and technology. Neither does it imply that provinces are internally homogeneous, with everyone within the province having the same concerns – concerns that differ from those elsewhere. Rather, it simply outlines the major concerns of many of the residents of individual provinces, beyond the more general concerns of all, or most, westerners. In later chapters we analyse areas of economic activity in natural resources, manufacturing, and the service sector in each of the provinces in the light of some of their goals.

Some Goals for the West

Our view is that the most important problem in the West is the lack of dependability of growth or the perception of such a lack. Not everyone would agree. Some would consider obtaining economic justice within Confederation, or a perception of that, as more urgent. No one would disagree, however, that lack of dependability in growth is a highly significant problem. That is the justification for the great emphasis given it in this report. Westerners, more than the average Canadian, believe that their economic destiny is not secure and that it is determined by forces they cannot control. A desirable goal, therefore, is to develop a set of provincial economies in which growth will be secure in the long term. If growth is not dependable enough, policies to make it more so would be highly welcome.

Other problems require solutions and other important economic goals need to be fulfilled as well. Many westerners believe that the variety of job opportunities should be such that the majority of persons will not be forced to leave the West permanently in order to make their economic way in the world. They think that the costs and benefits from our Confederation should be distributed fairly, and westerners should be confident that this is indeed so. Perhaps more controversially, some contend that the absolute population level, or even the share of the Canadian population, should not be contracted through forced out-migration to the point where a province loses its political influence in Confederation. In addition, some argue that levels of real income should be comparable, and remain comparable, to those in the rest of Canada, meaning that they should grow at the same rate. Finally, there is a belief that unemployment rates should remain low in the Prairie provinces and preferably fall in British Columbia.

Better performance with respect to some of these goals might be achieved if worse performance were acceptable for others. For example, the threat to the comparability of per capita incomes in the West to those elsewhere in Canada that is posed by the increasing difficulty in expanding natural resource output at previous rates might be countered by outmigration, thus sacrificing the goal of maintaining a constant political influence within Confederation. Vulnerability to resource prices and production might be offset by subsidizing diversification, even if that would lower real per capita incomes.

We shall not attempt to say in this document what balance should be struck between these and other possibly desirable goals. That is a local political decision. Rather, we present some ideas that would foster progress towards the achievement of one or more goals without undermining attempts to achieve the others. An important point here is that if the income yielded by natural resources improved, part of that extra income could be used to attain other goals, such as greater security through diversification or a greater absolute size of population, whatever the local political choice might be. In such cases, income per capita relative to that in other parts of Canada need not actually be reduced. In sum, we aim to provide an analysis that will make better achievement of several goals possible, while emphasizing that security of growth over the long run is, in our view, the most important priority.

2 The Economy and Economic Welfare of the West

In beginning our analysis of the concerns expressed by westerners, emphasis is placed on the variables that are basic to the economic well-being of individuals or families. We are particularly interested in the level of real income per capita, the rate of growth in real income per capita, the unemployment rate as a measure of the ability to find a job within a reasonable time and to keep it, the exposure to inflation, the degree of income instability, and the richness and variety of job opportunities available. Certain other variables of interest to westerners, though not themselves direct measures of economic welfare, will also be considered in the next chapter. There we look at the benefits and costs associated with being in Confederation, the population levels and growth rates, and the degree of economic diversification.

Overall, the performance of the western provinces with respect to these measures of economic well-being has generally been good, although it varies across measures and among provinces. Moreover, our analysis reveals that the western economies have provided not just incomes, but also job opportunities, comparable, for the most part, to those enjoyed in central Canada. This chapter provides the detailed analysis that has led us to what some might consider a rather surprising conclusion.

Table 2-1

Adjusted[1] Personal Income per Capita in the West Compared with the National Average, Canada, 1978-81

	Per capita income	Comparison with national average
	(1981 dollars)	(Per cent)
Eastern Canada		
Ontario	12,288	105.6
Quebec	10,670	91.7
Atlantic provinces	8,353	71.8
Western Canada		
Manitoba	10,387	89.3
Saskatchewan	11,096	95.4
Alberta	14,751	126.8
British Columbia	12,728	109.4
Western average	12,771	109.8
National average	11,633	100.0

1 Adjusted as follows: Figures are based on personal income per capita for the 1926-68 period and on personal income plus provincial government revenues from oil and gas per capita for the 1968-81 period. This concept takes into account the benefits derived by residents of the western provinces from their oil and gas resources; in the light of the substantial changes in oil and gas prices since 1973, it gives a better indication of western living standards than does personal income per capita in the traditional sense.

SOURCE Based on data from Statistics Canada.

Real Incomes

Our analysis reveals that per capita income in the West has recently been about 10 per cent above the national average. Over the three latest years for which data were available, 1978 to 1981, per capita income averaged $12,771, compared with the national level of $11,633 (Table 2-1).

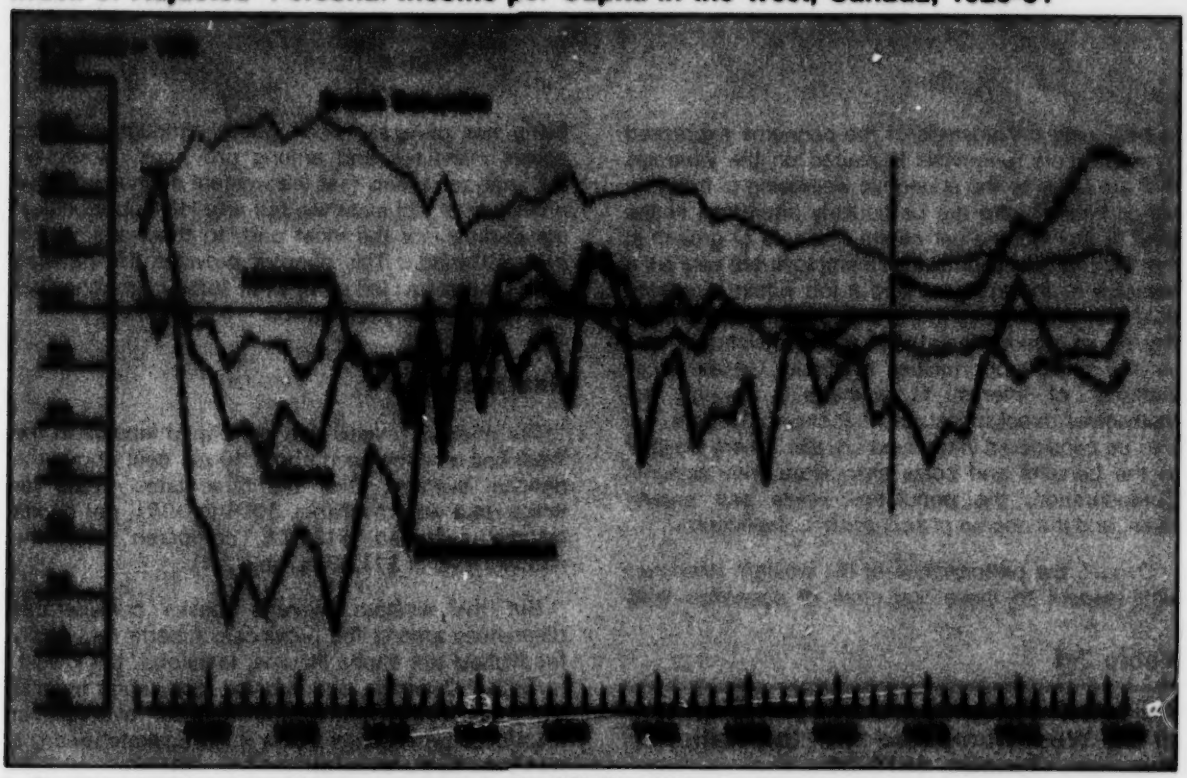
But the western average masks considerable differences among the provinces. Alberta had easily the highest per capita income; Manitoba, the lowest. In British Columbia and Alberta, per capita income was significantly above the national average; in Manitoba, significantly below it. In Saskatchewan, it was close to the average.

Is the pattern of recent years typical of the long-term pattern of incomes in the West? In some respects, yes; in others, no (Chart 2-1). Per capita income has always been well above average in British Columbia, though less so now than in the past. In the 1930s, per capita income in that province was more than 30 per cent above the Canadian average; now it is only 8 per cent higher. From a long-term perspective, Alberta has been an average-income province; only recently has its income risen above the national average. Saskatchewan, along with Manitoba, has typically had below-average income, barring a few exceptional years. Until recently, the former was easily the poorer of the two provinces, with income well below average; Manitoba's income was only slightly below average. It is too early to tell whether the recent reversal of their position is permanent.

Thus a fair summary of western per capita income over the years would indicate that, despite great prosperity in the 1970s, the Prairies have provided a somewhat average living standard for their inhabitants. Alberta's income has been high only in the last few years. Saskatchewan fared significantly worse

Chart 2-1

Index of Adjusted[1] Personal Income per Capita in the West, Canada, 1926-81



1 Figures are based on personal income per capita for the 1926-68 period and on personal income plus provincial government revenues from oil and gas per capita for the 1968-81 period. This concept takes into account the benefits derived by residents of the western provinces from their oil and gas resources; in the light of the substantial changes in oil and gas prices since 1973, it gives a better indication of western living standards than does income per capita in the traditional sense.

SOURCE Based on data from Statistics Canada.

than average until very recently; Manitoba, just slightly worse than average. Over the long term, British Columbia has performed very much better than the Prairies. Although allowance for interprovincial differences in living costs cannot accurately be made, a rough approximation suggests that our conclusions about the Prairie provinces would still hold, while British Columbia would register a slightly smaller advantage.

Another question focuses on income distribution among individuals or groups within the western provinces. In particular, does the higher-than-average proportion of native people, who are notoriously poor, hold down the average income in the West? This possibility can only be checked very roughly. Such a check suggests that the very low income levels of native people in Manitoba and Saskatchewan are not sufficient to explain the below-average income performance of these two provinces; nor would relative incomes in Alberta move significantly if the incomes of native people were excluded in calculating the average income for that province.

Changes in income are also important as a measure of economic well-being. Table 2-2 shows that in using that yardstick the West as a whole has performed at about the average rate for Canada. Nevertheless, growth rates have differed substantially between the individual provinces over the period shown, 1926 to 1981. In this case, British Columbia ranked lowest, with a growth rate of 3.0 per cent annually for the 1926-81 period, while Saskatchewan ranked highest with 4.1 per cent. Over the two-generation span, Saskatchewan per capita income rose from only about half that of British Columbia between 1926 and 1939 to its present position of only 15 per cent below the latter. Alberta also grew

faster than British Columbia, and started higher than Saskatchewan. Consequently it closed the gap with British Columbia and surpassed it, going from about 40 per cent below to 16 per cent above. Manitoba also grew a little faster than British Columbia, and its position relative to that province was therefore better at the end of the period than at the beginning.

Table 2-2

Rate of Growth of Adjusted[1] Personal Income per Capita in the West Compared with the National Average, Canada, Selected Periods, 1926-81

	Average rate of growth (1981 dollars)		
	1926-81	1945-81	1961-81
	(Per cent)		
Eastern Canada			
Ontario	3.1	3.1	3.9
Quebec	3.4	3.6	4.8
Atlantic provinces	3.4	3.6	5.1
Western Canada			
Manitoba	3.2	3.0	4.2
Saskatchewan	4.1	3.4	5.5
Alberta	3.9	3.8	6.2
British Columbia	3.0	3.0	4.4
Western average	3.6	3.4	5.2
National average	3.4	3.4	4.6

1 Adjusted as follows: Figures are based on personal income per capita for the 1926-68 period and on personal income plus provincial government revenues from oil and gas per capita for the 1968-81 period. This concept takes into account the benefits derived by residents of the western provinces from their oil and gas resources; in the light of the substantial changes in oil and gas prices since 1973, it gives a better indication of western living standards than does personal income per capita in the traditional sense.

SOURCE Based on data from Statistics Canada.

The interpretation of these long-run developments is very straightforward. The Depression and the dust bowl conditions of the 1930s damaged Alberta and Saskatchewan much more than they did British Columbia and Manitoba, but the former benefited more from the wartime recovery. In the late 1920s disparities among the western provinces were, as today, not very large. Growth rates became significantly more similar in the provinces from 1945 to 1981 than during the earlier period, and are probably more representative of the true long-term situation. Saskatchewan's growth rate advantage over British Columbia was very much smaller, Alberta's was a little smaller, and Manitoba's advantage vanished. Moreover, the income growth rate in the western provinces was now equal to the national average.

In sum, average income per capita in the western economies is presently somewhat above, and average growth about at, the Canadian level, yet there is much interprovincial variation. Incomes are well above the national average in Alberta and British Columbia, below it in Manitoba, and about the same in Saskatchewan, though this is a very recent development. By contrast, only small differences probably exist among the true long-term income growth rates, which seem to be about the same in the West as elsewhere, with small differences between the provinces. As a result of these differences, British Columbia's income advantage is narrowing, as is Saskatchewan's disadvantage. No established long-term trend in Manitoba or Alberta is apparent; the latter's recent above-average growth rate has been attributable, as is well known, to the growth in oil prices, which appears now to be essentially over.

In recent years growth rates have slowed down dramatically everywhere, including the West. As the recession abates, growth will pick up for the West, but whether permanently or temporarily is an open question. That question is the very heart of this report.

Some technical points should be added by way of a postscript to these conclusions. First, although the ideal comparison would be one between the real incomes of individuals in the West and those of identically qualified individuals in the rest of Canada, the data that would enable such a comparison do not exist. Those we have do not allow, for example, for the effects of the West having a different mix of high- and low-paying occupations or a different demographic structure. Second, indexes of price level differences, by province, are not available, though these differences affect the buying power of money incomes; in particular, housing prices differ considerably. Third, we have included transfers in total income, double counting to the extent that transfers are derived from a portion of the taxes paid by westerners. Fourth, proper allowance has not been made in the real income figures for those transfers to or from other provinces or for the portion of income from wealth that is not received through the market. Nor has any subtraction been made from income for that part of future tax obligations attributable to government-incurred international indebtedness now.

Finally, some economists argue that interregional income comparisons are, in any case, pointless. They say that if labour is reasonably mobile, any differences in measured real income will not matter. They will only reflect differences in the other advantages of living in a particular region, such as the risk of unemployment, the pleasantness of the climate, or the availability of public services. But if they were right,

there would be no point in looking at the economic performance of the West at all; instead, one would look at that of Canada as a whole, for mobility would make economic well-being invariant with respect to region. We do not think this is correct. We regard the equalizing effect of mobility on real income as a hypothesis that remains to be tested. We judge, however, that these numerous technical points do not significantly alter the accuracy of our conclusions.

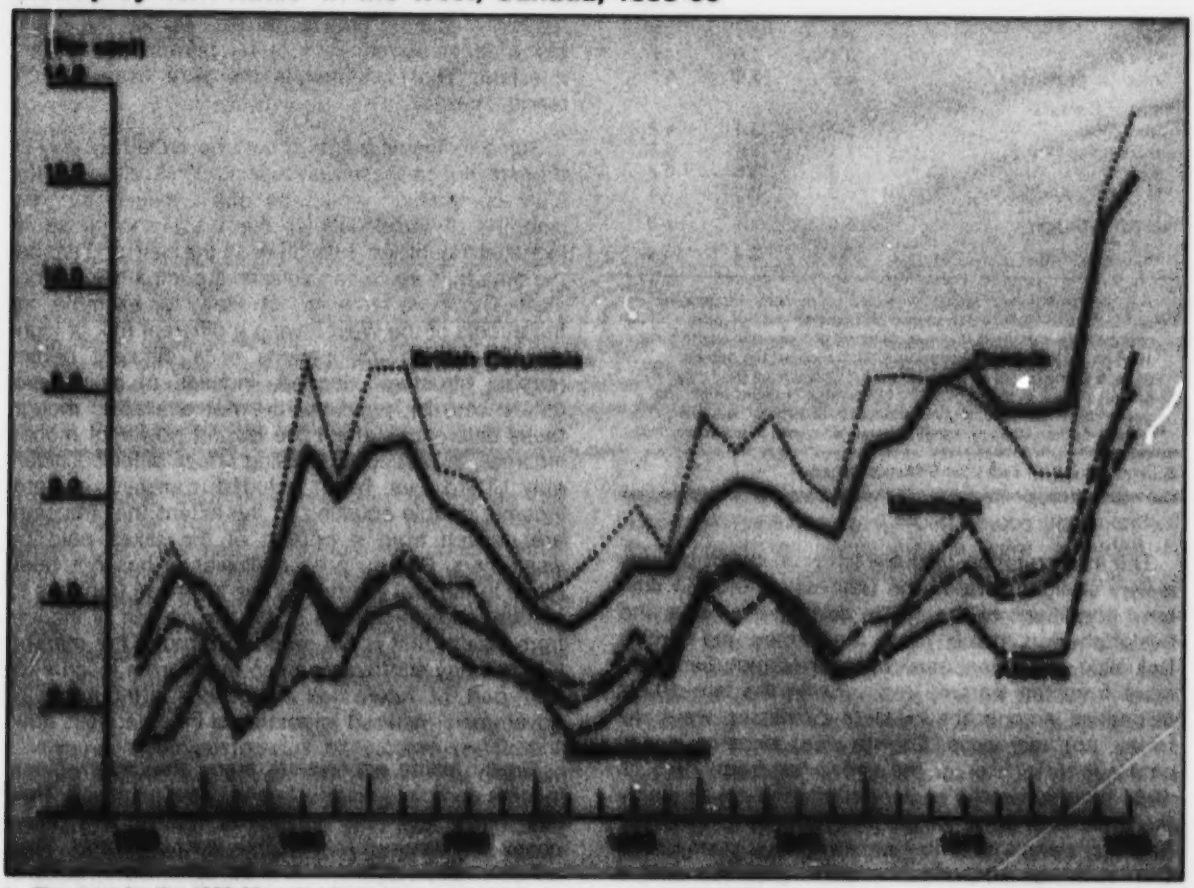
Inflation and Unemployment

In considering how well an economy performs one normally takes into consideration the rate of inflation. But complete data on western price levels and their rates of change do not exist. Partial data covering consumer prices other than housing suggest that the rate of inflation in the western provinces does not differ, except trivially and transitorily, from that in the rest of the country. Consequently, we shall not look at this variable.

By contrast, the West has been much better than average at keeping unemployment rates low (Chart 2-2). But more so than with income, the generalization is misleading. Unemployment rates in the Prairie provinces have usually been lower than average, whereas those in British Columbia have usually been higher than average. The unemployment rates in the Prairie provinces keep very closely in step, at about one-half to two-thirds of the national level and at about one-half of the B.C. level. In 1982, for example,

Chart 2-2

Unemployment Rates[1] in the West, Canada, 1953-83



1 The rates for the 1976-83 period have been adjusted to include persons 14 years of age and over, to be consistent with Statistics Canada's published historical series.

SOURCE Based on data from Statistics Canada.

when the national and B.C. rates were 11.3 and 11.9 per cent, respectively, unemployment rates on the Prairies averaged 6.6 per cent; in 1974, when the national rate was 5.4 per cent and the B.C. rate 6 per cent, the Prairie rate was 2.9 per cent. Recently, the rate in British Columbia has hovered around the national average, but this may not be a permanent change.

But the unemployment rate has often been criticized as a measure of an economy's ability to provide the chance to work. There is also the question whether differing degrees of difficulty in finding work across regions or occupations, even if validly demonstrated by differences in unemployment rates, imply differing degrees of hardship, given the greater generosity and availability of unemployment insurance benefits in recent years, the difference in the numbers of multiple-earner families, the variation in the degree of mobility of the labour force because of occupational and age differences, and other factors.

Most of the alternative measures of the chance of finding work are, in practice, closely related to the unemployment rate, and typically they provide much the same information about ease or difficulty in finding a job. In the present context of examining western economic performance, it is certainly fair to say that alternative measures of job availability would almost certainly yield similar conclusions. When looking for work, the chances of Prairie residents finding it within a reasonable time are much better than the national average; those of B.C. residents are worse than the national average.

The only exception to this generalization – namely, that various alternative measures are closely related to the unemployment rate – is the behaviour of the employment ratio. But a serious problem rules out its use for our purposes. By way of illustration, while the employment ratio in Ontario was lower in 1956 than in 1982, and indeed lower than the employment ratio in Quebec in 1982, no one would seriously suggest that it was harder to find work in Ontario in 1956 than in 1982 or than in Quebec in 1982. The difficulty is that changes in the employment ratio largely reflect a gradual social evolution of attitudes about the decision to work at various times. Since this evolution varies across provinces and regions and is at different stages at different times, interregional and intertemporal comparisons of job availability are rendered useless. Thus, whatever its value for other purposes, the employment ratio is not useful for ours, which is to assess the capacity of western economies to provide jobs in good time for those who seek them.

Better social safety nets, multiple-earner families, demographic shifts, and other changes mean that a given unemployment rate today, even if accurately measuring the ease or difficulty in finding work within a reasonable time, may not impose the same burden as in the past. Incidentally, we cannot be sure that the burden imposed is lighter. Better social safety nets and more multiple-earner families tend to make it so, but a higher proportion of households headed by women or of unattached individuals tend to make that burden greater.

For the purpose of comparing interprovincial and interregional performance, we note that the social safety nets are almost equally available everywhere but that the incidence of multiple earners, the demographic structure, and the fraction of households headed by women vary geographically. Because of this, we cannot state categorically that greater difficulty in finding work in British Columbia than in the Prairie provinces means greater hardship or that greater ease in finding work on the Prairies than in the rest of Canada means less hardship. What we can say is that such is the presumption.

Instability of Income

Instability comprises two distinct problems perceived by westerners. The first, and the more important one, concerns the long-run sustainability of growth in living standards in a resource-based economy. There is a worry that growth may not be sustainable in the long run, unless out-migration occurs. Evidence from the past cannot cast light directly on whether this fear is realistic or misplaced, for it shows only that growth in real per capita living standards has been sustained for many decades. The view that this is due to fortuitously repeated discoveries of new resources or to unsustainable improvements in the productivity with which existing resources are utilized is not testable in any simple way. Instead, much of this report is concerned with determining whether the West can permanently sustain growth in living standards with a stable or rising population through increases in resource output or in other ways. We therefore present no direct evidence here on this crucially important question of long-term income "insecurity."

Second, westerners also perceive income instability as income irregularity, in the sense of fluctuations about the trend. Direct evidence is available on this, and we shall examine it in this section. Repeatedly, spokesmen for western Canada have alleged that because their region is resource-based, westerners are particularly prone to income irregularity. Transfers alleviate the problem somewhat, but by no means do they solve it.

Westerners usually speak of instability in comparison with that in central Canada. For example, writing about the recent oil boom in "The Economic Development of Western Canada," Professor Owram stated:

> In the historical sense one more 'boom' is not of great significance to the West unless the boom can be used to provide freedom from booms and busts in the future. To the rest of the nation the concept of the 'boom-bust' cycle is not as strong.[1]

In considering these perceptions, the following questions need to be answered: Are western Canadian incomes as variable as those in central Canada? If they have been unstable in the past, are western incomes now becoming more stable? Are particular sectors more prone to instability?

Our analysis of income instability in the sense of irregularity begins by examining fluctuations of per capita incomes around the trend in the 1926-81 period (Table 2-3). Immediately we can see that the average percentage deviation of income from the trend was nearly twice as high for western Canada as Ontario and more than twice as high for the Prairies. In a province-by-province breakdown, the degree of variability was surprisingly wide. Saskatchewan had by far the greatest income instability – over 22 per cent, or $706 per year. This was about one-quarter greater than that of Alberta, twice that of Manitoba, and two-thirds greater than that of British Columbia.

Table 2-3

Instability of Total Income per Capita in the West Compared with That in Ontario, Canada, 1926-81

	Mean	Average deviation from trend	
	(1981 dollars)	(Per cent)	(Dollars)
Ontario	6,202	7.5	370
Western Canada	5,428	13.3	533
Prairie provinces	5,086	15.6	558
Manitoba	5,083	10.6	415
Saskatchewan	4,672	22.8	706
Alberta	5,379	14.8	562
British Columbia	6,169	8.7	487

SOURCE Based on data from Statistics Canada.

Focusing on wages and salaries alone, Table 2-4 shows that the deviation from trend of the aggregate was 9 per cent in the West, compared with 7 per cent in Ontario. Hence the degree of instability was much lower in wages and salaries than in total income. In addition, the degree of instability in the West was fairly close to that in Ontario. Even when excluding British Columbia, the percentage deviation only rose to 11 per cent. Saskatchewan again showed the highest degree of instability, with the deviation from trend being close to 12 per cent.

Table 2-4

Instability of Wages and Salaries per Capita in the West Compared with Those in Ontario, Canada, 1926-81

	Mean	Average deviation from trend	
	(1981 dollars)	(Per cent)	(Dollars)
Ontario	4,267	7.2	239
Western Canada	3,318	9.3	242
Prairie provinces	2,934	10.9	237
Manitoba	3,168	9.7	227
Saskatchewan	2,214	12.4	216
Alberta	3,244	11.2	264
British Columbia	4,134	8.4	314

SOURCE Based on data from Statistics Canada.

One would suspect that farm income contributed the most to income instability in western Canada. Relative to wages and salaries, farm income in all provinces exhibited a high degree of variability (Table 2-5). For Ontario, the deviation was 26 per cent. Relative to Ontario, the West had much higher instability, with farm incomes varying more than 50 per cent from the trend, on average, from year to year. Excluding British Columbia, the average deviation from trend amounted to over 55 per cent – more than double that of Ontario. Average per capita income in the Prairie farm sector was $685, but there was an average fluctuation in this, year by year, of $310. For the farmers themselves, both average income and average dollar instability were much higher, though the percentage deviation would be close to that in the table. Of the four western provinces, Saskatchewan, as expected, had the highest degree of instability in farm income at 62 per cent; British Columbia had the lowest, at 23 per cent.

This "first-glance" analysis then shows that overall income variability was nearly twice as high in the West as in Ontario for the 1926-81 period. Wages and salaries exhibited well-below-average instability everywhere. By contrast, farm income showed very high variability, with the Prairies having over twice the farm income variability of Ontario. Of the four western provinces, British Columbia had the least income variability, regardless of how this was measured.

Table 2-5

Instability of Net Farm Income per Capita in the West Compared with That in Ontario, Canada, 1926-81

	Mean	Average deviation from trend	
	(1981 dollars)	(Per cent)	(Dollars)
Ontario	185	26.1	50
Western Canada	503	50.6	220
Prairie provinces	685	55.7	310
Manitoba	407	48.9	170
Saskatchewan	1,074	62.3	541
Alberta	633	42.9	255
British Columbia	132	22.5	31

SOURCE Based on data from Statistics Canada.

But the variability in incomes over that long period conceals important changes in more recent years. Indeed, most of the instability over the period as a whole was due to variations in the 1926-45 period (Table 2-6). Income fell drastically during the Depression and rose dramatically during the Second World War.

Income in the 36 years from 1945 to 1981 was much more stable. Variability in Ontario fell from 13 per cent in the 1926-45 period to 5 per cent in the 1945-81 period; in the West it fell from 22 to 9 per cent and on the Prairies, from 27 to 10 per cent. In Saskatchewan the percentage deviation fell from 39 to 14; in Manitoba, from 17 to 7; and in Alberta, from 25 to 9. Notable is the significant reduction in the gap between the variability in the West as a whole, and in Ontario. Prairie income is more unstable than income in the West as a whole, but even there instability fell substantially compared with that of the preceding 30 years; however, it remained double that of Ontario. Saskatchewan's instability rated highest of all the western provinces, at 14 per cent; British Columbia's was the lowest, at 7 per cent. Alberta and particularly Manitoba rated quite well.

Looking now at some components of total income, we note that the variability in wages and salaries also fell to about half of what it had previously been. Ontario fell to 4 per cent and the Prairies to less than 5 per cent. Except for Saskatchewan, British Columbia had the highest wage and salary variability of the western provinces; yet it was still a relatively low 6.2 per cent. Farm income instability fell substantially in the 36 years after 1945. In all provinces the variability declined by about half, although the instability remained high. Variability in the West averaged 28 per cent, compared with 19 per cent in Ontario. Farm income in Saskatchewan, which was high relative to that in the other western provinces, also showed the greatest instability. British Columbia had the lowest degree of instability, at 12 per cent.

What becomes clear from this analysis is that, based on a comparison of the 1945-81 and 1926-45 periods, income instability has not only fallen, but the difference in the degree of variability between Ontario and the West as a whole has narrowed considerably, having gone from 9 percentage points to 4. That result can hardly be overstressed: average incomes in the last 35 years or so have been only slightly more unstable in the West than in Ontario. The growing weight of service employment in the West, or "diversification" of a sort, is probably a major cause.

Table 2-6

Deviation from Trend of per Capita Total Income, Wages and Salaries, and Farm Income in the West Compared with Those in Ontario, Canada, 1926-45 and 1945-81

	Average deviation from trend					
	Total income		Wages and salaries		Farm income	
	1926-45	1945-81	1926-45	1945-81	1926-45	1945-81
	(Per cent)					
Ontario	13.1	4.8	12.1	4.1	28.5	18.9
Western Canada	22.3	8.6	13.1	5.2	72.9	27.8
Prairie provinces	26.7	9.8	13.1	4.9	82.7	30.2
Manitoba	17.3	7.2	12.5	4.4	59.5	33.4
Saskatchewan	38.6	14.4	13.4	6.5	95.6	38.4
Alberta	25.4	9.0	13.3	5.3	57.6	25.5
British Columbia	12.4	6.8	11.3	6.2	22.1	12.2

SOURCE Based on data from Statistics Canada.

Three other results of our analysis are worthy of note. First, the variability in farm income has fallen dramatically, and the difference in the degree of farm income variability between Ontario and the West or between Ontario and the Prairies has narrowed considerably. Second, although the Prairie provinces remain less stable than Ontario, the difference is surprisingly very small. Third, Saskatchewan's instability remains very high.

We conclude that income instability in a restricted sense – that is, the medium- or short-term fluctuation of incomes around the trend – is no longer significantly any *more* serious for western Canada as a whole than for central Canada, although it is for Saskatchewan.

The Variety of Occupational Opportunities

Embedded in the grievances generally articulated by western Canadians is the belief that western Canada lacks economic opportunities. The commonly held view is that in order to capture a "good" job, young people must move to central Canada where the greatest opportunities allegedly lie.

The definition of a "good" job clearly varies according to the values held by individuals. An electrician, for example, may define his job as good because it allows him relatively high mobility among various industries. Meanwhile, a farmer may contend that his job is preferable because of the flexibility of work hours and the independence of managing his own operation. Some occupational benefits can be quantified, such as income; others cannot, such as the flexibility of work hours. Through the influence of our environment and education, however, most Canadians define a good job as one that demands high educational qualifications and enables the attainment of a high income and high social status.

The traditional notion that westerners must move eastward to capture a good job implies the availability of more top-ranking jobs in central Canada than in the West. But how realistic is this perception? Are western Canadians still hewers of wood and drawers of water? Is central Canada a repository of good jobs? Or is this just what westerners assume because

Table 2-7

Distribution of Labour Force, 15 Years of Age and Over, in Occupational Categories, by Socioeconomic Rank, Central and Western Canada, 1971

	Manitoba	Saskatchewan	Alberta	British Columbia	Central Canada	Western Canada
			(Per cent)			
Occupational category:						
Managerial	4.0	3.2	3.9	3.6	4.7	3.7
Social sciences and related fields	0.9	0.7	0.9	0.9	1.0	0.9
Natural sciences, engineering, mathematics; medicine and health	6.5	5.5	7.0	6.3	6.6	6.4
Religion, teaching and related fields	4.2	4.4	4.4	3.7	4.4	4.1
Artistic, literary, recreational	0.8	0.6	0.7	0.9	1.0	0.8
Transport, material handling, other crafts, equipment operating	7.2	6.2	7.0	9.0	7.3	7.7
Clerical, sales, service occupations	36.2	30.1	35.9	39.3	36.9	36.3
Processing, machining, product fabrication, assembling, repair, construction	17.8	11.7	15.9	20.4	22.0	17.3
Forestry and logging; mining and quarrying	1.0	1.2	1.4	2.8	1.1	1.8
Farming, horticulture, animal husbandry; fishing, hunting, and trapping	11.9	27.5	13.0	3.5	4.0	11.4
Occupations not elsewhere classified and occupations not specified	9.5	8.9	9.9	9.6	11.0	9.6
Total	100.0	100.0	100.0	100.0	100.0	100.0

SOURCE Based on data from Statistics Canada and B. R. Blishen and H. A. McRoberts, "A Revised Socioeconomic Index for Occupations in Canada," *Canadian Review of Sociology and Anthropology*, 13(1) 1976.

that may have been the case 50 years ago? We have uncovered some very surprising facts that give a new and significantly different impression from the one so often held of job opportunities in western Canada.

Using the socioeconomic class scale of almost 500 occupations constructed by Bernard Blishen and Hugh McRoberts (Appendix Table A-1), we classified jobs into 10 broad categories, ranked in descending order of social prestige.[2] Table 2-7 shows the percentage of Canadians in central and western Canada who are employed in each of these 10 broad occupational categories. From this table we determined whether there were significant differences between the occupational structures of central and western Canada in 1971 and particularly whether there was any more likelihood of being employed in a good job in the former.

Fewer than 5 per cent of employed individuals in the two regions worked in a managerial capacity. The percentage was higher in central Canada but not as much higher as one might have expected. For example, for every five of such jobs that were open to a given person in the East, there were four in the West. Surprisingly, it is not until the eighth category that any significant differences in job opportunities become apparent. Of the first seven, the differences were small, and in four categories the percentages employed within them were almost identical. The clerical, sales, and services category is especially significant not only because a very large proportion of Canadians were employed in those occupations but because the proportions in central and western Canada differed by only half of 1 per cent. On this evidence, central Canada does not offer a disproportionately larger percentage of good jobs.

The question remains, however, as to whether this balance holds for the occupations at the lower end of the scale. One would expect that relatively more westerners work in the mines and on the land, while more central Canadians work in huge assembly plants and factories. Indeed, the most striking differences on the scale arise in the lowest-ranking categories. Moving down the scale to the last category – namely, farming and horticulture – the percentage of central Canadians falls and that of western Canadians rises. These findings tend to confirm the belief that western Canadian employment has been more heavily weighted in favour of primary industry, while central Canada has provided a higher percentage of jobs in processing, machining, manufacturing, assembling, repair, and construction. As well, according to the Blishen and McRoberts socioeconomic index, among the lowest-ranking jobs the relatively larger proportion of central Canadians employed in assembly-line work tended to have had higher-ranking jobs than the relatively larger proportion of western Canadians employed in primary industry.

Between the provinces, there are differences in the distribution of employment, and how much of a contrast, if any, there is with central Canada, is shown in Table 2-7. The employment distribution in Saskatchewan contrasts most with that of central Canada. Central Canadians are almost twice as likely to be employed in art, literature, and recreation as persons in Saskatchewan. At the opposite extreme, the chance of being employed in farming, fishing, and hunting, is seven times higher in Saskatchewan than in Ontario. In Manitoba, by contrast, the percentage of workers in any occupational category is closer to the percentage in central Canada than the aggregate of the West in six out of ten cases. Alberta's distribution of employment shows the same tendencies as Saskatchewan's – towards primary industry and away from processing – although not as extreme. Surprisingly, the distribution of employment is quite similar in British Columbia to that in central Canada; 20 per cent of British Columbians were employed in the processing category in 1971, compared with 22 per cent of central Canadians. Farming, fishing, and trapping employed 3.5 per cent of British Columbians and 4.0 per cent of central Canadians. Thus Saskatchewan and Alberta are not as close in occupational structure to central Canada as are British Columbia and Manitoba.

If one accepts that the good jobs are largely contained in the uppermost categories, the above analysis suggests that the West's perception that

Table 2-8

Proportion Employed in the Top Five Jobs of the Five Highest Occupational Categories, Central and Western Canada, 1971

	Central Canada	Western Canada
	(Per cent)	
Managerial	11.7	12.7
Social sciences and related fields	42.0	35.9
Natural sciences, engineering, mathematics; medicine and health	7.2	7.9
Religion, teaching and related fields	48.1	46.0
Artistic, literary, recreational	34.8	30.0

SOURCE Based on data from Statistics Canada and B. R. Blishen and H. A. McRoberts, "A Revised Socioeconomic Index for Occupations in Canada," *Canadian Review of Sociology and Anthropology*, 13(1) 1976.

proportionately more good jobs can be found in central Canada than in the West is largely incorrect. The percentage of western Canadians employed in the highest-ranking categories was almost equal to that of central Canadians in 1971. That balance, however, is not evident in the three lowest-ranking occupations. A small but disproportionate percentage of western Canadians were employed in the lowest category. A larger percentage of people in both regions were employed in processing; nevertheless, the processing industries supported about 22 per cent of the employed in central Canada, compared with 17 per cent in the West.

Despite the relatively good showing of western Canada in the top categories, however, the figures may disguise a subtle problem. Westerners may still suspect that, within those categories, central Canadians held the "best" jobs. To throw some light on whether this was indeed the case, we examined the five top-ranking occupational groupings. We looked specifically at what percentage of the people within each group were in the top five jobs of that group in the West and in central Canada (Table 2-8). We found that in 1971 a higher percentage of westerners held top jobs in the managerial category and in the natural science, engineering, mathematics, medicine, and health categories. For the remaining three categories, the percentages in the top five jobs were minimally lower. In any category the percentages do not differ by more than seven points. Thus the performance is comparable in the two regions. It is possible that jobs of apparently equal ranking carry greater decision-making power in central Canada. It is also possible that the very topmost jobs – the chief executive officer, the deputy ministers, and the university presidents – are found disproportionately in central Canada. There was a limit to our capacity to disaggregate. But we did go down to rather detailed levels, without finding very much difference in availability of "very good" jobs.

Table 2-9

Proportion Employed within Selected High-Ranking Fields of Health, Finance, and Education in Central and Western Canada, 1971

	Rank	Central Canada	Western Canada
		(Per cent)	
Health:			
Dentists	3	2.0	2.0
Optometrists	5	0.5	0.5
Physicians and surgeons	6	8.9	8.4
Pharmacists	11	2.6	3.3
Dieticians and nutritionists	59	0.6	0.5
Health diagnosing and treating occupations	107	0.5	0.2
Nurses, graduate (excl. supervisors)	156	29.4	27.3
Nursing therapy and other assistants	301	2.2	4.7
Nursing aides and orderlies	366	20.2	25.4
Finance:			
Financial management occupations	33	2.1	0.8
Accountants, auditors, and financial officers	37	22.3	22.2
Supervisors: bookkeeping, accounting, and related	76	2.8	2.6
Bookkeeping, account recording, and related, n.e.c.	159	1.1	0.8
Bookkeeping and accounting clerks	160	43.3	44.6
Insurance, banks, and other financial clerks	173	4.6	3.9
Tellers and cashiers	274	23.8	25.1
Education:			
Administrators in teaching and related occupations	1	7.2	8.0
University teachers	10	6.0	6.5
Education and vocational counsellors	14	1.1	1.3
Secondary school teachers	15	29.1	28.6
Elementary and kindergarten teachers	49	38.3	37.3
Teachers of exceptional students, n.e.c.	139	1.5	1.2

SOURCE Based on data from Statistics Canada and B. R. Blishen and H. A. McRoberts, "A Revised Socioeconomic Index for Occupations in Canada," *Canadian Review of Sociology and Anthropology*, 13(1) 1976.

Similarly, the proportion of central Canadians holding jobs within the three high-ranking fields of health, finance, and education was remarkably similar to that of western Canadians (Table 2-9). In health, the greatest differences existed within two jobs ranked at the lower end of the scale: nurses (excluding supervisors) and nursing aides and orderlies. In finance, both central and western Canada had a huge proportion in either top-ranking jobs (accountants, auditors, and financial officers) or in mid-ranking jobs (bookkeeping and accounting clerks); in no case were the central/western differences very great. Similar patterns emerged in the field of education, except that the greatest proportion of jobs held within the six occupations listed were high-ranking compared with all occupations – namely, secondary school teachers, and elementary and kindergarten teachers. The proportions of central and western Canadians in each of these two categories were almost identical.

Thus our findings do not support the contention that central Canadians hold the highest-ranking jobs within those fields. The only inferences that can be drawn are that some high-ranking jobs are held in greater proportion by western Canadians; some in greater proportion by central Canadians. There are differences, but the differences are not major.

On balance, job opportunities in western Canada in 1971 were not as limited as expected. Perhaps this was a phenomenon unique to that time period, however. A decade earlier, job opportunities may have been more limited; and 50 years ago one could expect the picture to be much graver, with jobs severely limited to primary industry in the West and with administrative and professional jobs largely based in central Canada. And what about the present? Are the surprisingly broad job opportunities of 1971 as evident in western Canada today or are they perhaps even better? To answer these questions we begin by comparing 1971 results with those of 1961; then we repeat the exercise for 1921; and, finally, we examine current job opportunities by analysing the findings for 1981.

Using a slightly modified classification system that would enable us to compare occupations on a basis as similar as possible to that used for 1971 classification, we found that the general picture was essentially the same in 1961 (Table 2-10); 1971 was not unique. In central and western Canada, good jobs were equally available in the top-ranking occupations even in 1961. Considering the worst jobs, however, the West's were somewhat worse than central Canada's.

Shifting back another 40 years to 1921 once again causes some classification problems; but, as before, a general picture can be drawn. Managerial and professional categories accounted for only a slightly smaller proportion of the work force, and there was roughly the same balance between regions as existed in 1961 and 1971 (Table 2-11). A striking feature in 1921 was the huge proportion of Canadians who were employed in agriculture – 45 per cent of western

Table 2-10

Distribution of Labour Force 15 Years of Age and Over, in Occupational Categories, by Socioeconomic Rank, Central and Western Canada, 1961

	Central Canada	Western Canada
	(Per cent)	
Managerial	8.4	8.5
Professional	10.0	9.2
Transport	6.0	5.8
Clerical, sales, services	32.1	30.4
Processing, crafts	26.6	19.2
Primary occupations	7.0	6.6
Farming	7.3	17.8
Occupations n.e.c.	2.6	2.5
Total	100.0	100.0

SOURCE Based on data from Statistics Canada and B. R. Blishen and H. A. McRoberts, "A Revised Socioeconomic Index for Occupations in Canada," *Canadian Review of Sociology and Anthropology*, 13(1) 1976.

Table 2-11

Distribution of Persons, 14 Years of Age and Over Employed in Occupational Categories, Central and Western Canada, 1921

	Central Canada	Western Canada
	(Per cent)	
Managers, officials, owners	8.2	7.1
Professional	6.0	5.3
Transport	6.1	6.6
Clerical, sales, service, and finance	23.8	20.9
Manufacturing and construction	23.4	9.3
Forestry and logging; mining and quarrying	1.9	4.1
Agriculture	27.0	44.6
Unspecified industries	3.6	2.1
Total	100.0	100.0

SOURCE Based on Department of Trade and Commerce, *Sixth Census of Canada, 1921* and B. R. Blishen and H. A. McRoberts, "A Revised Socioeconomic Index for Occupations in Canada," *Canadian Review of Sociology and Anthropology*, 13(1) 1976.

Canadians and 27 per cent of central Canadians. Western Canada was indeed a primary-based economy in 1921; yet it is wrong to infer that the best jobs at that time were in central Canada. Both the West and central Canada had about 20 per cent of its employees in the top three categories.

Western Canada came through best in 1981 (Table 2-12); the proportion employed in the top seven categories there was extremely close to that in central Canada. Even among the lowest-ranking occupations the proportions did not differ greatly.

Table 2-12

Distribution of Labour Force, 15 Years of Age and Over, In Various Occupational Categories, by Socioeconomic Rank, Central and Western Canada, 1981

	Central Canada	Western Canada
	(Per cent)	
Managerial	7.0	6.7
Social sciences and related fields	1.6	1.6
Natural sciences, engineering, mathematics; medicine and health	7.8	7.7
Religion, teaching and related fields	4.4	4.0
Artistic, literary, recreational	1.5	1.1
Transport, material handling, other crafts, equipment operating	7.0	7.0
Clerical, sales, services	40.1	39.5
Processing, machining, product fabricating, assembling, repair, construction	21.6	18.5
Forestry and logging; mining and quarrying	0.9	1.8
Farming, horticulture, animal husbandry; fishing, hunting, and trapping	3.2	7.2
Occupations not elsewhere classified and occupations not specified	4.9	4.9
Total	100.0	100.0

SOURCE Based on data from Statistics Canada and B. R. Blishen and H. A. McRoberts, "A Revised Socioeconomic Index for Occupations in Canada," *Canadian Review of Sociology and Anthropology*, 13(1) 1976.

In sum, good jobs are just about as available in western Canada as in central Canada. Detailed occupational data strongly suggest that there is equal room at the top in both regions. Only at the extreme top does the possibility of western underrepresentation remain open. As for jobs that are generally considered poor, western Canadians have a slightly higher chance than central Canadians of being in a very poor job as opposed to a moderately poor one. Even this latter difference, however, is much smaller than many would probably suspect. Overall, the occupational pattern and opportunities are, quite surprisingly, much the same in western as in central Canada. This conclusion continues to hold, in large part, even for more restricted comparisons, such as that of the Prairies with central Canada or of the Prairies with Ontario alone.

Conclusion

The western economies do considerably better with respect to our basic economic indicators than traditionally believed. Occupational choice is as rich as in central Canada; and, Saskatchewan aside, incomes are almost as stable. The level of per capita income – perhaps the most important variable for economic well-being – is above average, but there are significant interprovincial differences. Incomes in Alberta and British Columbia are well above average; in Saskatchewan, about average; and in Manitoba, somewhat below average. Income growth rates have been close to those elsewhere throughout the period since the Second World War, with some moderate interprovincial differences, sufficient to create some modest convergence towards a common western average. Unemployment rates are very low throughout the Prairies in relation to national levels; in British Columbia, they are usually a little above those levels.

3 The West and Confederation

Whether the West gains or loses from being in Confederation turns out to be unanswerable. How we reached this conclusion is rather intriguing, and the issues involved are of great concern to westerners and nonwesterners alike. In the process of considering this question, we also examined the growth rate of the population, the degree of economic diversification, and the role of exports, all important considerations in the West.

Confederation: Benefits and Costs

Traditional concerns about whether the West has received a fair deal in Confederation focus on five areas. First, the view is often expressed that western Canada pays the costs of tariffs but receives few or none of the benefits. Second, a number of long-standing grievances cluster around the feeling that transportation rates discriminate against western producers and shippers, and often in such a way as to perpetuate resource production and discourage further processing. Third, many westerners wonder if the disproportion between the federal tax revenue and royalties from the West and the federal expenditures in the West is larger than is really fair. Fourth, federal decision making in nonmonetary areas is seen to be unresponsive to western concerns as a consequence of the habitually low representation of the West, in relation to its population, in the federal Parliament. Finally, the heavy proportion of head offices in central Canada means that private decision making, particularly in financial institutions, is considered unresponsive to the concerns of the West, at best, and sacrificial of western interests to those of central Canada, at worst.

A full assessment of this list of grievances is not the purpose of this report, which is more narrowly focused on the possibility of improving the existing situation. Nevertheless, we shall assess the grievance about the tariff and the sharing of tax revenues here; the whole area of transportation in the West is examined in Chapter 10.

The Tariff

Tariffs are often claimed to be part of the "price we pay for being Canadian." Some in the West argue, however, that a disproportionate share of the costs of tariffs, or of being Canadian, is borne by westerners and that the benefits in the form of greater employment in manufacturing accrue to central Canada. We do not dispute the claim that tariffs reduce national income per capita and redistribute income among labour, capital, and land. Indeed, the Economic Council has argued elsewhere (in *Looking Outward*)[1] that the tariff does have a negative effect on the economy. But the claim that the West bears more of the cost is somewhat misleading, because it conceals a range of transfers that occur in all regions of Canada.

In considering the impact of tariffs we need to compare the present situation with some alternative. The one we choose is multilateral free trade in the future. Analysts generally agree that the multilateral elimination of tariffs from all sources would be more beneficial to Canada than a more restricted free trade area. Moreover, this is the kind of change presently in train as a result of successive GATT agreements.

We pose the "fair deal" question in the context of this alternative by asking whether westerners would benefit more than central Canadians, or lose less, from a move to freer trade. If so, by implication they are losers relative to central Canada under present arrangements. We ask about the effects of multilateral free trade, for both westerners and central Canadians, on real income per capita; the rate of growth of real income per capita; the rate of unemployment; the degree of occupational choice; the size of population; the growth rate of the population; the structure of industry; and the distribution of wealth.

Real income per capita is generally predicted to rise under free trade through a combination of specialization and scale effects. Estimates range from a gain of one or two percentage points to a high of about 15 per cent, depending partly on the degree to which reductions obtained are multilateral and partly on the vanished tariffs not being replaced by nontariff barriers. The gain would probably appear in prices, which would not rise as much over the period of tariff reduction as otherwise. Thus wage gains would not be eroded by inflation by as much as they would normally be. Since tariff reductions would likely be multilateral, it seems likely that little change in the external value of the Canadian dollar would or need occur; thus gains and losses through this route seem unlikely. All areas of the country would benefit similarly from a period of more slowly rising prices

relative to wages, since the relationship between prices in one area and another would not be disturbed. Thus the income gains would favour everybody. The rate of growth of income is not expected to be permanently affected, but temporarily there would be faster growth during the period of tariff reduction.

What will happen to the unemployment rate is harder to judge. Transitory effects are possible but not inevitable. Permanent effects seem most unlikely, since there is neither theoretical nor empirical warrant for believing that the rate of unemployment will be permanently higher or lower as a result of tariff elimination. Transitory unemployment could occur if the jobs created in expanding industries were different in type or location from the jobs destroyed in shrinking industries. Evidence suggests that transitory unemployment will not be a major problem numerically, though it will be very serious for those who are affected.

The evidence also favours the view that most of the adjustment will occur within the manufacturing sector rather than between the manufacturing and primary sectors, so that any transitional unemployment would impinge more heavily on manufacturing, and hence on central Canada. The implication is that the retention of the tariff, by avoiding this problem, favours central Canada somewhat in terms of the unemployment rate. It avoids a small and transitory rise in that rate.

Would tariff reduction improve the distribution of occupational opportunities in western Canada? Since the Council's evidence shows that most of the adjustment would be within the manufacturing industry, with the size of the industry as a whole not being significantly affected, the occupational pattern is unlikely to change very much. To the extent that it does, the change would occur in central Canada rather than the West. Removal of the tariff would not affect the variety of occupational opportunities in the West. Consequently, on this account as well, removal of the tariff would lead to neither gain nor loss of occupational variety for western Canada.

A related question is whether the reduction of tariffs would affect the distribution of the existing population between the West and central Canada? Would more people move to the West or fewer, or would the numbers be about the same as now? We see no reason to expect much change, with one possible reservation, which will be dealt with when we come to consider effects on the distribution of wealth. Income would rise about the same in the West as elsewhere, so that there should be no change in population distribution on that account. We do not expect jobs to be transferred from manufacturing to resources or to resource upgrading but, instead, to be largely redistributed within manufacturing. Changes would therefore, occur mostly within central Canada, not between central Canada and the West. To the extent that there is some temporary unemployment in central Canada, this could encourage some westward migration but very little, because the evidence is that differentials in income rather than in unemployment typically drive the migration process. In sum, we expect neither the total population nor its distribution within Canada to be much affected by any future tariff reductions, and so we conclude that the West would not lose any population.

The effect of tariff removal on the distribution of wealth is also difficult to determine, because the research on the subject is inadequate. A commonly predicted effect is that by decreasing the demand for labour-intensive goods relative to resource- and capital-intensive goods, the tariff lowers wages, raises rents on resources, and increases the amount of capital in use. If the proportion of the population that owns resources is higher in the West than elsewhere, a higher proportion of westerners than nonwesterners would gain from tariff removal on account of the ensuing rise in the value of natural resources. Removal of tariffs would then yield a transfer of wealth from the rest of Canada to the West. If this were so, the West would currently be losing on this account from the existing tariff.

Unfortunately, we do not know how resource-intensive Canadian manufactures would be under free trade compared with the present ones. Furthermore, the only effect that would unambiguously favour the West – namely, a switch to the export of more resources and fewer manufactures, as well as to less domestic production of manufactures – is not expected to occur.

In sum, it appears that both the West and central Canada lose from the present tariffs. The only benefit is the avoiding of a small and transitory increase in the unemployment rate in central Canada, but that is essentially insignificant.

The Balance of Federal Expenditures and Revenues

Looking at the balance sheet of federal expenditures and revenues might be thought of as one way to assess the question of whether the West receives a fair deal from Confederation. We found, however, that such an exercise told us little about the issue.

The balance sheet allocates total federal expenditures on goods, services, and transfers across provinces, just as it distributes total federal revenues across provinces. The difference between the two is taken for each province. Where the difference ("net

benefit") is positive, the province is receiving a net financial contribution from others in Confederation; conversely, where the difference is negative, the province is making a net financial contribution.

The balance sheet exercise is most useful, and indeed is only really feasible, when its rules are such as to make the balance over all provinces sum to zero. It is thus defined from the beginning as a zero-sum game. As such, however, it elides the more interesting question of whether Confederation is such a game. Confederation could be any of the following: a positive-sum game in which all participants gain – a strong federalist view; a positive-sum game in which some participants lose – a separatist view; a positive-sum game in which no one loses but some gain significantly less than others – a weak federalist view; or a negative sum game in which most lose – a strong separatist view. Which it was would depend on the alternative being considered – namely, a free trade agreement, a common monetary system, or some other arrangement.

In the balance-sheet exercise that we undertook, the balance across the provinces does not equal zero when federal expenditures, by province, are totalled and revenues subtracted. Revenues typically fall short of expenditures by a substantial margin, due to the issue of debt, which cannot be allocated provincially in any straightforward way. To conform to our zero-sum game requirement, the debt had to be allocated, and this we did in the same proportion as for the sum of all other revenues.

Distributing shares of federal expenditures is not always straightforward either. The expenditures fall into two broad groups: one is goods and services, such as national defence, the provision of justice, statistical data collection, and ports; the other is transfers. Allocating transfers to provinces is seldom difficult; allocating goods and services sometimes is. For example, should the benefits of Canadian defence expenditures be allocated proportionately to population because people are defended or proportionately to wealth because property is defended? We chose population. Numerous arbitrary decisions have to be made on issues like this, but they do not seriously jeopardize the validity of the calculations. Generally we allocated goods and services according to where they are consumed, not according to where they are produced. For instance, statistical services are mostly produced in Ontario but are consumed in

Table 3-1

Distribution of Federal Expenditures and Revenues, Canada, 1937

	Central Canada		Western Canada					
	Quebec	Ontario	Manitoba	Saskat-chewan	Alberta	British Columbia	Rest of Canada[1]	Canada
				($ Thousands)[2]				
Gross expenditures and revenues:								
Total benefits paid	128,138	191,949	30,653	54,201	28,091	41,065	39,779	513,877
Per family	213	215	187	261	149	196	173	206
Per capita	41	53	43	59	36	54	36	46
Less:								
Total federal taxes collected	140,891	223,966	25,052	20,419	22,216	35,816	31,671	500,034
Per family	234	251	153	98	118	171	138	200
Per capita	45	62	35	22	29	47	29	45
Total debt	4,510	7,162	439	99	243	896	494	13,843
Per family	7	8	3	--	1	4	2	6
Per capita	1	2	1	--	--	1	--	1
Net benefits:								
Total	-17,263	-39,179	5,162	33,683	5,632	4,353	7,614	0
Per family	-29	-44	32	162	30	21	33	0
Per capita	-5	-11	7	37	7	6	7	0

1 Excludes Newfoundland.
2 Except for per-family and per-capita figures, which are expressed in dollars.
SOURCE Based on data from Statistics Canada.

all provinces, so the benefits of these services are allocated to all provinces rather than just to Ontario. Thus the balance-sheet approach refers to the distribution of consumer benefits, not to the distribution of jobs.

A controversial issue is whether job creation through the location of government activity is not in itself a benefit, so that some benefits are not being counted in our approach. The main benefits possible from such job creation are of two kinds: one is a reduction in the unemployment rate; the other is an increase in the volume of employment and the labour force (and hence in the provincial population), with no change in the unemployment rate. A reduction in the unemployment rate would unambiguously be a benefit. But no consensus exists on whether it is possible for the relocation of government activity to reduce permanently the unemployment rate in a province. Limited evidence suggests not. The problem is, at bottom, a tendency for more government jobs to lead in the long term to a crowding out of private-sector jobs. The benefits are certainly unlikely enough to make it inappropriate to allow for them in a balance-sheet exercise. An increase in the volume of employment and in the labour force, with no change in the unemployment rate, is more of a possibility. That would be a benefit, however, only if a larger provincial population were desirable.

To the extent that job creation is desirable, there is probably an uncounted cost in our balance-sheet exercise, deriving from the fact that the size of the western population is slightly smaller than it would be if federal government jobs were distributed among provinces more nearly in proportion to provincial populations. We have not tried to include this cost – partly because of its controversial nature, partly because of its uncertainty, and partly because of not knowing how the dollar equivalent of its value could be calculated for balance-sheet purposes. In this respect it stands as one of the many other uncounted and uncountable costs and benefits of Confederation.

Despite the problems of allocating federal expenditures and revenues, the numbers in the balance sheet provide a *rough* answer to several questions: What would be the direct *dollar* gains or losses for a province, based on government activities alone, in the hypothetical event of exit from Confederation? How much would taxes go up or down – in total, per

Table 3-2

Distribution of Federal Expenditures and Revenues, Canada, 1961

	Central Canada		Western Canada					
	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Rest of Canada	Canada
				($ Thousands)[1]				
Gross expenditures and revenues:								
Total benefits paid	1,918,691	2,651,697	410,712	425,771	590,655	796,039	878,155	7,671,718
Per family	1,610	1,616	1,713	1,735	1,688	1,732	2,052	1,684
Per capita	365	425	446	460	443	489	454	421
Less:								
Total federal taxes collected	1,689,120	2,870,349	306,489	265,042	484,268	666,152	455,591	6,737,010
Per family	1,418	1,749	1,278	1,080	1,384	1,450	1,065	1,479
Per capita	321	460	333	286	364	409	235	369
Total debt	275,739	434,078	33,958	19,984	45,988	79,749	45,212	934,708[2]
Per family	231	265	142	81	131	173	106	205
Per capita	52	70	37	22	34	49	23	51
Net benefits:								
Total	-46,168	-652,730	70,265	140,745	60,399	50,138	377,352	0
Per family	-39	-398	293	573	173	109	882	0
Per capita	-9	-105	76	152	45	31	195	0

1 Except for per-family and per-capita figures, which are expressed in dollars.
2 This is the difference between total benefits paid and federal taxes collected. It is equal to the federal government debt on a financial management basis for the fiscal year ended March 31, 1962.
SOURCE Based on data from Statistics Canada.

capita, and per family? Those gains or losses are one element to be weighed when assessing all the other aspects of being in Confederation, including the common market, the political factors, the risks involved in fracturing a nation in the event of separation, the satisfaction to be gained from supporting other provinces, and the emotional and historical attachments to a country.

But it is important to keep the dollar gains or losses in perspective by considering more than one year. We look at 1937, 1961, and 1981. Through the history of Confederation the balance of costs and benefits has probably shifted several times.

Tables 3-1, 3-2, and 3-3 are all constructed in similar fashion. Table 3-3 illustrates the hypothetical gains or losses in 1981. To interpret all three, consider by way of illustration the column in Table 3-3 headed "British Columbia." The first number, $7,644 million, is a measure of gross benefits and indicates that federal government expenditures of this amount were either paid directly to British Columbians (transfers) or spent on federal goods and services yielding value to British Columbians. The second number gives the same amount expressed on a per-family basis ($7,670); the third, on a per-capita basis ($2,786). Going down the column, taxes ($8,390 million in total) must be subtracted from the benefits as must oil and gas revenues, and the debt obligations incurred. Gross benefits, less taxes, oil and gas revenues, and debt obligations, yield the "net benefits." These were negative for British Columbia, at –$1,666 million, meaning that this much less was received in benefits in that particular year than was paid in taxes or otherwise. Thus if British Columbia were to cease to be a member of Confederation, $l,666 million is a very rough measure of the current annual saving that would accrue. Per family, the saving would be $1,671 a year, or $607 per capita.

The three tables should now speak for themselves. In 1937 and 1961 the provinces with positive net benefits were those in the western and Atlantic

Table 3-3

Distribution of Federal Expenditures and Revenues, Canada, 1981

	Central Canada		Western Canada					
	Quebec	Ontario	Manitoba	Saskat-chewan	Alberta	British Columbia	Rest of Canada	Canada
				($ Thousands)[1]				
Gross expenditures and revenues:								
Total benefits paid	19,180,530	26,237,708	3,504,254	3,217,963	5,668,510	7,644,019	8,967,883	74,420,866
Per family	8,827	8,835	9,789	9,672	7,476	7,670	12,935	8,986
Per capita	2,141	3,042	3,415	3,323	2,533	2,786	3,894	3,057
Less:								
Total federal taxes collected	13,786,445	25,685,603	2,416,718	2,358,325	7,487,576	8,390,022	4,513,078	64,638,019
Per family	6,344	8,649	6,751	7,088	9,875	8,418	6,509	7,805
Per capita	2,141	2,978	2,355	2,435	3,346	3,058	1,960	2,655
Net federal intake from oil and gas	0	5,084	8,752	322,989	3,516,806	144,841	-460,000	3,538,472
Per family	0	2	24	971	4,638	145	-663	427
Per capita	0	1	9	334	1,572	53	-200	145
Total debt	1,389,998	2,557,072	189,829	242,906	695,623	774,927	394,020	6,244,375[2]
Per family	640	861	530	730	917	778	568	754
Per capita	216	296	185	251	311	282	171	257
Net benefits:								
Total	4,004,087	-2,010,051	888,955	293,743	-6,031,495	-1,665,771	4,520,785	0
Per family	1,843	-677	2,483	883	-7,955	-1,671	6,520	0
Per capita	622	-233	866	303	-2,696	-607	1,963	0

1 Except for per-family and per-capita figures, which are expressed in dollars.
2 This is the difference between total benefits paid and the sum of federal taxes collected and the net federal intake from oil and gas. It is equal to the federal government debt on a financial management basis for the fiscal year ended March 31, 1982.
SOURCE Based on data from Statistics Canada.

regions; only Ontario and Quebec had negative net benefits. In 1937 the net balances, whether positive or negative, were very small indeed, even bearing in mind the very low incomes of that year. The situation was not much different in 1961; the numbers were a little larger, both absolutely and relative to incomes at that time, but still very small. In 1981 the pattern was different. Alberta and British Columbia had switched from being recipients of positive net benefits to having negative net benefits. The change in Alberta, perhaps not surprisingly, was large. Quebec shifted from having negative, though very small, net benefits to having positive, substantial, net benefits. Manitoba, Saskatchewan, and the Atlantic region continued to have positive balances; but the size of those balances, except for Saskatchewan, was considerably greater than before, in dollars and compared with incomes at that time.

There are three main difficulties in interpreting these results. First, is a positive net balance good or bad? Typically it implies that people in the province or region concerned are poorer than average. Taxes collected from them are lower, and payments of unemployment insurance and certain other transfers, higher. A positive net balance is therefore a bad sign, indicating that people there are less well off than average. But it also implies that they are better off than if they were not in Confederation at all. Similarly, a net negative balance usually implies richer-than-average residents and a less-than-average need for transfer payments. Being richer than average is presumably good, but the province is less well off than if it were not in Confederation.

Second, how does one offset negative balances at one time against positive balances at another? Alberta and British Columbia, for example, have had positive balances in the past, on a small scale but over many years; recently they have had negative balances, which are large in Alberta's case. The future is anybody's guess. Quebec has recently had significant positive balances; yet in earlier times they were negative, albeit small.

Third, it must be recognized that the benefits and costs of being in the federal system range far beyond those counted in any balance-sheet exercise. On the economic side, it is likely that the Canadian gross national product is higher than it would be if the nation were divided into several small ones. But much depends upon how restricted the movement of goods, labour, and capital might be in such a situation. Political and social aspects are not amenable to economic calculus; the question of whether federal decision making, in both economic or noneconomic matters, fairly represents western desires and aspirations is one of these.

Each of us on the Council has our own personal views on these broad issues, but they lie outside our mandate, and so we do not comment upon them. Because of them, however, we believe that the balance-sheet exercise is of only limited interest.

Level and Growth of Population

In assessing the health of their economies, provinces often consider population increase as desirable. Yet, from an individual's point of view, a higher-than-average population increase in a province is neither good nor bad. Higher income and lower unemployment rates, as well as other variables such as instability of income and variety of job opportunities, matter to individuals; but, given these, individuals are not significantly affected economically by whether the population is growing or shrinking. Relative population growth is usually a good summary *indicator* of relative economic performance, but it adds no significant information to that supplied by the more basic indicators. In one special circumstance, however, population growth might matter in its own right – that is, when a province has a unique lifestyle and culture, which is valuable to its inhabitants and cannot be preserved without a minimum population size or without a minimum share of the national population. This argument can certainly be made, for example, in the case of Quebec. While recognizing the differences between western provincial societies, these do not seem to constitute a powerful enough reason for treating population level and growth rates in the West on the same footing as the more fundamental indicators of economic welfare. Nevertheless, since some will disagree with us, we shall examine some data on population and population change.

Perhaps the most startling population statistic is that the West's share of the Canadian population has

Table 3-4

Population in the West as a Proportion of the Total Population, by Decade, Canada, 1921-81

	Manitoba	Saskatchewan	Alberta	British Columbia	The West
			(Per cent)		
1921	6.9	8.6	6.7	6.0	28.2
1931	6.7	8.9	7.1	6.7	29.4
1941	6.3	7.8	6.9	7.1	28.2
1951	5.5	5.9	6.7	8.3	26.5
1961	5.1	5.1	7.3	8.9	26.4
1971	4.6	4.3	7.5	10.1	26.6
1981	4.2	4.0	9.2	11.3	28.7

SOURCE Based on data from Statistics Canada.

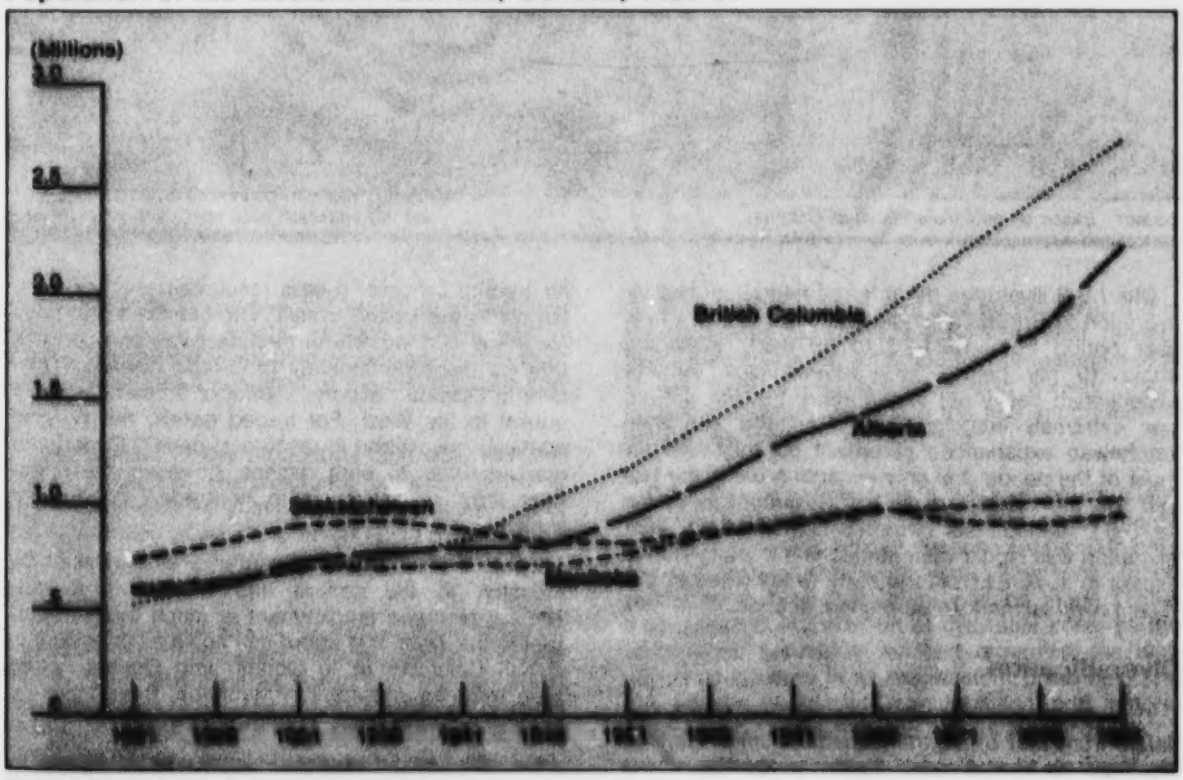
not changed in 60 years; it was 28.2 per cent in 1921 and 28.7 per cent in 1981. Slightly more than one in four Canadians is a westerner, and that has been so for more than half a century. Table 3-4 shows that the variations within the 60-year span were rather minor. The western share was one percentage point higher in 1931 and two percentage points lower in 1951, 1961, and 1971. The rapid growth of the 1970s increased the western share by 2 percentage points – from 26.6 per cent to 28.7 per cent – restoring its position of the 1920s and 1930s. From this perspective, it seems too early to judge whether the boom of the 1970s marks the beginning of a shift westward or just the restoration of an old pattern.

The overall stability of the western population share conceals great differences between the provinces. British Columbia and Alberta gained tremendously in total population and in their shares of the Canadian population. Saskatchewan and Manitoba gained only slightly in total population, while their combined share of the Canadian total was one-half of what it was 60 years earlier (see Chart 3-1 and Table 3-4). Population shifted westward within the West, not within Canada. For every ten people in Alberta or British Columbia in 1921, there were twelve in Manitoba or Saskatchewan; by 1981 there were only four. To keep this in perspective, it should be added that Manitoba's population nevertheless grew by 68 per cent; Saskatchewan's, by 28 per cent.

The differences in growth patterns were brought about much more by migration, both international and interprovincial, than by natural increase. Natural increase contributed to variations in the rate of growth through time but in a similar way everywhere (Chart 3-2). Rates of natural increase dropped everywhere in the late 1920s and stayed low throughout the 1930s. They began to pick up in the 1940s and continued to rise until about the middle of the 1950s. Then a long downward swing began throughout the 1960s and early 1970s, with a leveling off in 1976-81.

Chart 3-1

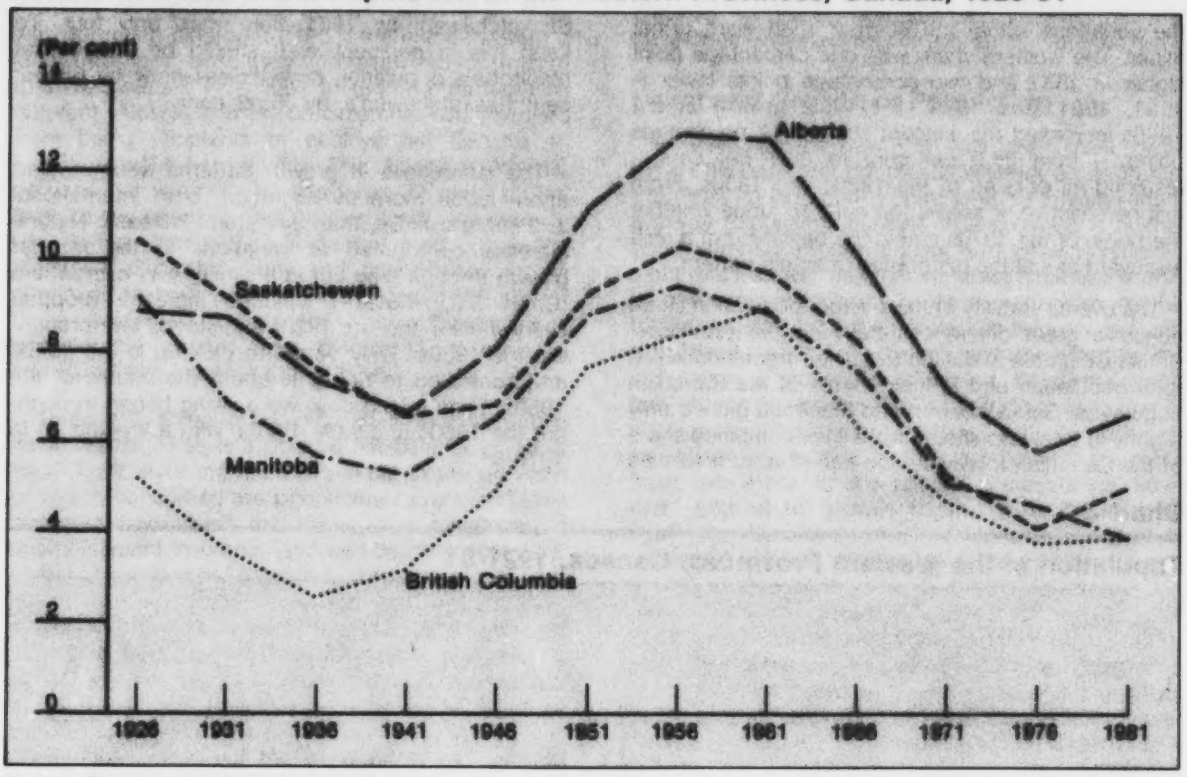
Population of the Western Provinces, Canada, 1921-81



SOURCE Based on data from Statistics Canada.

Chart 3-2

Natural Increase in the Population of the Western Provinces, Canada, 1926-81



SOURCE Based on data from Statistics Canada.

Chart 3-3 illustrates the rates of migration. Net in-migration in British Columbia was high in every five-year period from 1921-26 to 1976-81, averaging about 10 per cent – with several dips. Alberta experienced heavy net in-migration, but the pattern was extremely irregular. Both Manitoba and Saskatchewan experienced persistent out-migration for most of the period, the only exception being the last half of the 1920s and, for Saskatchewan, the 1976-81 period. As well, Saskatchewan's out-migration was higher than Manitoba's in every period except in 1976-81. It is too early to tell whether this recent reversal marks a permanent change.

Diversification

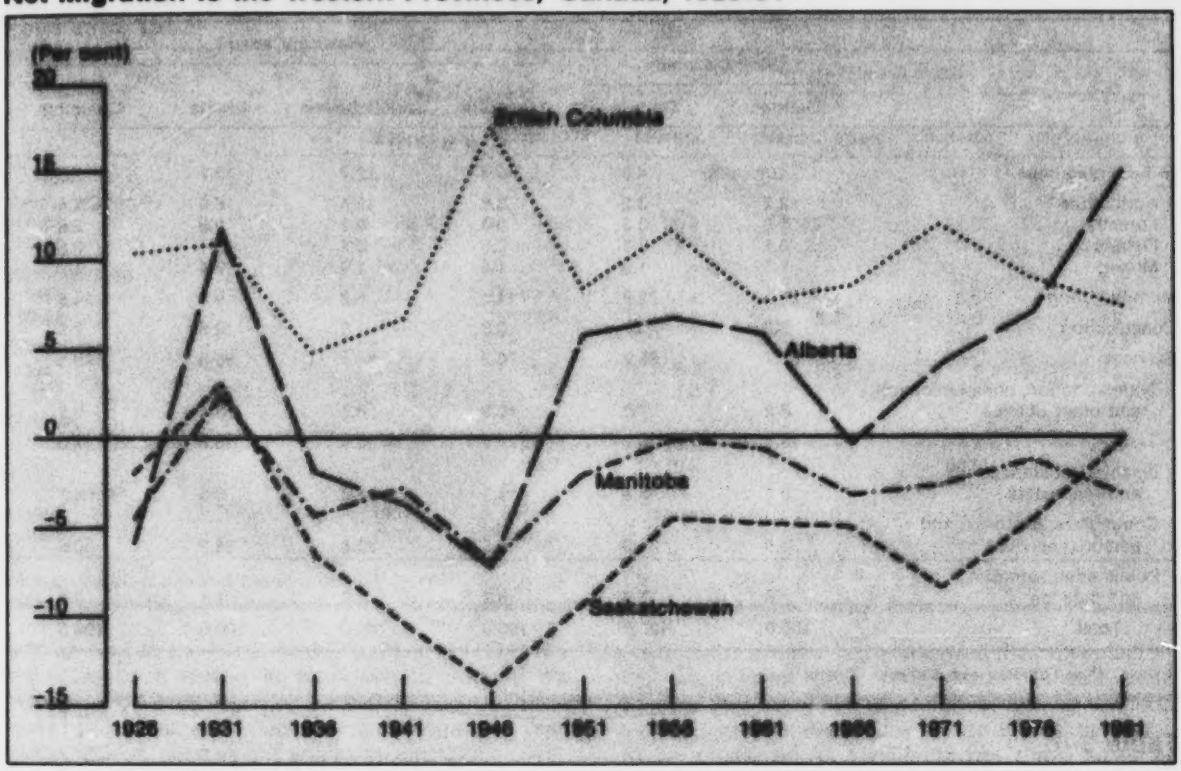
The economic structure of the western economies differs from that of central Canada. Central Canada produces for itself a much greater proportion of the manufactures it consumes than does the West, which obtains much of what it consumes through a triangular trading process. It sells resource-based exports, largely to the United States. The outside world pays for these with exports of manufactures and services that go disproportionately to central Canada. Then central Canada "exports" some of its manufactured output to the West. For traded goods, the West is relatively specialized in resources; central Canada, in manufactures. In both regions, however, the dominant form of activity is in nontraded goods and services.

Table 3-5 shows the structure of employment, by industry, in the central and western provinces. Natural resource employment is much more important in the West. It is about half again as important in British Columbia as in Ontario and Quebec; more than twice as important in Manitoba; three times, in Alberta; and five times, in Saskatchewan.

Manufacturing is correspondingly less significant. In the B.C. and Manitoba economies, manufacturing employs just over half as high a proportion of the

Chart 3-3

Net Migration to the Western Provinces,[1] Canada, 1926-81



1 As a proportion of previous Census population.
SOURCE Based on data from Statistics Canada.

labour force as in Quebec or Ontario; in Saskatchewan, only about a quarter as high. Alberta falls in between, with the proportion employed in manufacturing being about two-fifths of the central Canadian level.

Employment in the production of goods, whether natural resources, manufactures, or construction, is everywhere dwarfed in importance by employment in the production of services, which accounts for about two-thirds of the employment in the western provinces.

About three-quarters of all jobs in every province fall into the "nontraded" sector, which includes construction and services combined. The remaining quarter is divided between manufacturing and natural resources. In central Canada, these two are split as follows: 83 per cent, manufacturing; 17 per cent, resources. In British Columbia the split is 67 per cent and 33 per cent; in Manitoba, 57 per cent and 43 per cent; in Alberta, 40 per cent and 60 per cent; and in Saskatchewan, 21 per cent and 79 per cent, respectively. Because a higher proportion of manufacturing in the West is resource-processing activity, these figures somewhat understate the true importance of natural resources for employment.

Does the picture change if we look at economic structure in terms of output rather than employment? A precise answer is difficult because appropriate data are not categorized by province; thus only rough estimates of output structure can be made (Table 3-6). Detailed examination of this table confirms the conclusions previously reached regarding the high weight of services in all the western provinces, and the relative shares of manufacturing and natural resources in the western and central provinces.

The current industrial structure is also very different from what it used to be. A comparison of the data for

Table 3-5

Distribution of Labour Force, by Industry, Central and Western Canada, 1981

	Central Canada		Western Canada			
	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
	(Per cent)					
Natural resources	4.7	4.6	10.4	22.7	13.7	7.3
Agriculture	2.7	3.3	8.5	19.4	6.9	2.4
Forestry	0.8	0.3	0.3	0.3	0.3	2.8
Fishing	0.1	0.1	0.3	0.1	--	0.5
Mining	1.1	1.0	1.4	2.9	6.4	1.7
Manufacturing	22.4	23.8	14.1	6.2	9.0	14.8
Construction	5.2	5.7	5.3	7.0	10.8	7.9
Services	67.7	65.9	70.2	64.1	66.5	70.1
Transportation, communication, and other utilities	8.2	7.2	10.3	8.1	8.4	9.2
Trade	16.4	16.8	17.4	16.9	16.9	17.6
Finance, insurance, and real estate	5.1	5.9	5.1	4.3	5.5	5.6
Community, business, and personal services	30.5	29.0	28.6	26.8	28.2	30.5
Public administration and defence	7.6	7.0	8.7	7.9	7.4	7.2
Total	100.0	100.0	100.0	100.0	100.0	100.0

SOURCE Based on data from Statistics Canada.

Table 3-6

Estimated Distribution of Output, by Various Industries, Central and Western Canada, 1981

	Central Canada		Western Canada			
	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
	(Per cent)					
Natural resources	4.0	4.7	11.6	29.3	29.7	8.5
Manufacturing	23.9	27.1	14.9	5.0	7.8	14.9
Construction	4.6	4.1	4.0	6.1	10.5	7.8
Services	67.5	64.1	69.4	59.6	52.0	68.8
Total	100.0	100.0	100.0	100.0	100.0	100.0

SOURCE Estimates by the Economic Council of Canada, based on data from the Conference Board of Canada.

1961 and 1981 reveals four remarkable changes (Table 3-7).

First, there has been enormous growth in the relative importance of the service sector in every province except British Columbia, where its importance was already much greater than average. This "servicization" of the economy means that two out of three employed persons are now in services, compared with one out of two 20 years ago. The especially important growth areas have been in services to business, including computer services, business consultancy, accoun'ng, marketing, and hospitality; in medical care and education; in banking and financial services; in retail and wholesale trade; and in services to consumers, as in the case of food con-

Table 3-7

Distribution of Labour Force in Various Industries, Central and Western Canada, 1961 and 1981

	Central Canada		Western Canada			
	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
	(Per cent)					
Natural resources						
1961	11.8	9.9	20.2	39.5	26.0	10.2
1981	4.7	4.6	10.4	22.7	13.7	7.3
Manufacturing						
1961	27.2	27.5	13.9	4.8	8.8	20.2
1981	22.4	23.8	14.1	6.2	9.0	14.8
Construction						
1961	7.4	6.6	6.2	5.5	7.8	6.5
1981	5.2	5.7	5.3	7.0	10.8	7.9
Services						
1961	53.7	56.1	59.7	50.3	57.3	63.2
1981	67.7	65.9	70.2	64.1	66.5	70.1
Total						
1961	100.0	100.0	100.0	100.0	100.0	100.0
1981	100.0	100.0	100.0	100.0	100.0	100.0

SOURCE Based on data from Statistics Canada.

sumed outside the home and entertainment. Growth has also been strong in such service sectors as transportation, especially truck and air; communications; provincial and municipal administration; and public utilities, such as gas and electricity.

Second, there has been a very marked decline in the importance of the natural resource sector. It is about half as important as it used to be, except in British Columbia. Even in that province there has been a significant relative decline. Changes in the Prairie provinces are especially dramatic, given the great importance of resources for employment there in 1961. That year, out of every 100 persons employed in Saskatchewan, 40 were in the resource industries; in Alberta, 26; and in Manitoba, 20. By 1981 these numbers had dropped to 23 for Saskatchewan, 14 for Alberta, and 10 for Manitoba. Meanwhile, in British Columbia, the percentage dropped from an already-low 10 in 1961 to 7 in 1981. A most revealing way to view these numbers is by noting that of the four western provinces only Saskatchewan was noticeably more resource-oriented in 1981 than was central Canada in 1961. Thus, Saskatchewan aside, by 1981 the West was no more dependent on resources for employment than was central Canada in 1961. At that time, few thought of central Canada as being vitally dependent on natural resource industries for jobs. Should one so regard the West today?

Third, the Prairies have narrowed their manufacturing employment gap with central Canada quite considerably. In 1961 a person in central Canada was six times as likely as a person in Saskatchewan to be employed in manufacturing; three times as likely in Alberta; and twice as likely in Manitoba. By 1981 these ratios had dropped considerably, to four for Saskatchewan, two-and-a-half for Alberta, and one-and-a-half for Manitoba. The change is not due exclusively, or even in large part, to the growth in resource-associated manufacturing in the West, such as petrochemicals; rather, it is a result of the decline in the relative importance of manufacturing in central Canada. By contrast, on the Prairies manufacturing grew somewhat. Moreover, that growth was spread broadly across a majority of the manufacturing industries.

Fourth, whether in central Canada or the West, all regions have become significantly less dependent on external trade. The proportion of employment in industries that trade internationally or that are subject to competition from imports has dropped substantially. In Ontario it is 25 per cent below the level in 1961; in Quebec, 30 per cent below; in Manitoba, 21 per cent; in Saskatchewan, 35 per cent; in Alberta, 33 per cent; and in British Columbia, 24 per cent. A corollary is that the degree of sensitivity to the vagaries of international markets, in the West as well as in the rest of Canada, has fallen markedly.

Exports from the West and Countertrade

Two concerns often expressed are that the West is significantly more dependent on external trade than the rest of Canada and that the kinds of products it exports are subject to much greater variability in total value. That makes trade and trade policy of greater relative significance in the West than elsewhere. We have tried to recognize this throughout our report and especially in our treatment of individual resources. Here, we focus on two special issues that affect all traded services: instability and "countertrade." Our first question is whether export dependency creates significantly greater instability in the West.

Data on western exports do not exist, so we cannot test directly whether the West is much more dependent on trade than the rest of Canada. Despite that, some alternative data can be assembled to help judge the validity of export-linked instability. They suggest that, on balance, concern has been exaggerated, at least for the last 20 years. Instability in export receipts does not seem to be a significantly greater problem for the West than for the rest of Canada.

That does not mean that export-linked instability is not a problem for parts of the West, such as Saskatchewan, or for certain other parts of Canada, such as northern Ontario. Nor does it mean that it is not a problem for particular industries, such as the lumber industry, in both the West and the rest of Canada. Nor does it mean that there cannot be problems in the future, as we shall see. It does mean that the degree to which export instability in the West has differed recently from that in the rest of Canada is not very large.

To establish this fact, the first evidence is the data on the overall instability of the gross provincial and national products presented in Chapter 2. They showed that the western economy as a whole is now nearly as stable as that of the rest of Canada. It could be that exports in the West have had a tendency to create greater instability but that this has been offset in some way, such as by compensating variations in imports. Nevertheless, exports have not, in the end, been a source of significantly greater instability in the West than elsewhere.

Reasoning purely abstractly, every export might be more volatile in the West than elsewhere, without total export value being more volatile. For example, wheat prices or yields could be down, but if cattle prices were up, there might be less instability in total export receipts in the West than in any of the individual components. Some cancelling of this sort should happen, since demands in world primary product markets are not perfectly correlated; nor are supply conditions for different western products.

Some direct evidence on the degree of instability of exports in the West and the rest of Canada can be gleaned by classifying exports from Canada into two groups: "western-style exports" such as wheat, oil and gas, and copper; and "nonwestern-style exports" such as automobiles, electrical machinery, and nickel. The division is never perfectly clear-cut. The rest of Canada usually has some western-style exports also; for example, Ontario has copper, and Newfoundland has oil. And the West often has some nonwestern-style exports – for example, some textiles and vehicles. In two major product classes – forest products and fish – both regions are strongly represented. In cases like these, the exports were classified as "western-style." If anything, this procedure exaggerates western instability and nonwestern stability, in contrast with the true, unobservable situation.

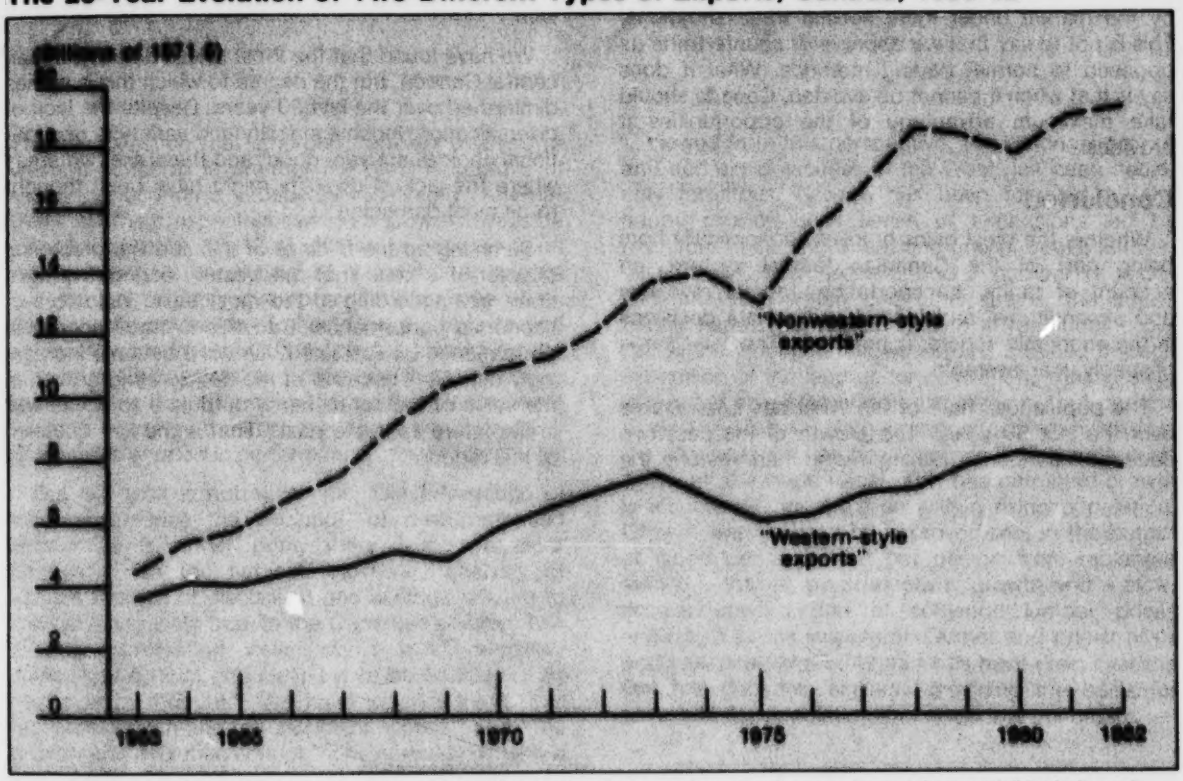
Chart 3-4 shows the path of western-style and nonwestern-style export values over the 20-year period 1963-83. Both kinds of exports grew rapidly, but nonwestern-style exports grew much more rapidly, at 7.3 per cent per annum as opposed to 3.9 per cent for western-style exports. This result, incidentally, is consistent with the tendency for the western economies to have become steadily less dependent on tradable goods as time passed, especially when one also takes into account the more rapid growth in manufacturing in much of the West and the possibilities for import substitution that this must have opened up. It is also consistent with trade still being more important in the West than elsewhere, although, as noted, data to confirm this do not exist.

Instability in export growth is our main concern here. It was quite moderate for both kinds of exports. The average deviation from trend growth for western-style exports was 5.8 per cent and for nonwestern-style exports 3.5 per cent, indicating that western-style exports are indeed more volatile. The important point, however, is that the absolute degree of volatility is low and that the difference between the degrees of variability, 2.3 percentage points, is very low indeed. Since this difference is the most relevant number in deciding whether the western economies are more vulnerable to instability because of the volatility of export receipts, we conclude that indeed they have been but only to a trivial degree.

Taking all the evidence into account, our conclusion is that the kinds of exports typical of the West have *not* made the West significantly more unstable than the rest of Canada – a very surprising result. If we look to the future, the conclusion may not be as reassuring, for two reasons. First, as we shall show in

Chart 3-4

The 20-Year Evolution of Two Different Types of Exports, Canada, 1963-82



NOTE "Western-style exports" include, for example, wheat, oil and gas, and copper; "nonwestern-style exports" include such commodities as automobiles, electrical machinery, and nickel. Of course, neither type is restricted exclusively to the West or to the rest of Canada.

SOURCE Economic Council of Canada, CANDIDE Model 2.0.

Chapter 7, there may be greater instability ahead in grain export values than has been the case over the last few years. Second, it is possible that the growth in "countertrade" will increase instability.

The growth of "countertrade" is important, both for its own sake and for its possible influence on instability. "Countertrade" means partial or complete barter. It is bilateral and necessitates a commitment by an exporter to accept full or partial payment in goods produced by the importer.[2] The form of the barter element varies. A straight exchange of goods is possible, such as wheat for watches. Or, an exporter of equipment or technology may accept, or be obliged to take, some of the resulting output from that equipment in partial payment for the equipment itself. And so on.

This kind of trade is economically inefficient in comparison with more normal forms of trade; yet it is better than no trade, if that is the alternative. It seems likely to grow in importance, because the reasons for it are growing in importance. Countertrade is extensively used by planned and developing economies, both of which are expected to trade more, as living standards grow. It seems likely to be intrinsically less stable than other forms of trade, since the economics of setting up deals and financing them must favour more infrequent, but larger, transactions than those which would occur if money were used exclusively as the medium of exchange. Countertrade may therefore increase the instability of western exports in the future. It will certainly do so for individual commodities; whether it will do so for all trade, however, is less certain. At the same time, the growth of countertrade also implies greater benefits in the future than in the past from collective efforts at marketing by western producers. The expense and difficulty of taking advantage of countertrade opportunities means that collective, as opposed to individual, action, whether

by industry associations or by governments, or by the two combined, can be socially valuable, substituting in countertrade situations for the functions performed by the market under more normal trade situations. This is not to say that we approve of countertrade as opposed to normal trading methods. What it does say is that when it cannot be avoided, Canada should take maximum advantage of the opportunities it provides.

Conclusion

Whether the West gains or loses economically from being part of the Canadian federal system, on account of tariffs, transportation, federal revenues and expenditures, and federal and private decisions in the economic sphere, is not clear. The question is probably unanswerable.

The population share of the West has been stable over the last 60 years. The growth of the past two decades has done nothing more than restore the position of the 1920s. Within the West there has been a very marked westward shift to Alberta and British Columbia, and away from Manitoba and Saskatchewan.

We have found that the West is less diversified than central Canada, but the degree to which this is so has diminished over the last 20 years. Despite the lack of diversification, income stability and variety in occupational choices are very good; and these are two areas where the lack of diversity might have been thought to be most damaging.

Summing up the findings of this and the preceding chapter, it is clear that the western economies have done well according to the most basic indicators of economic performance. Can this lustrous economic performance be sustained? Or will it become increasingly difficult – because of the decelerating growth in the value of natural resource outputs – to do as well in the future as in the past? That is the key question of this report.

4 A Framework for Analysis

The key question that emerged from our analysis of western concerns is whether the West is capable of sustaining economic prosperity indefinitely. Alternatively, will the prospects for western growth always be insecure because the West ultimately depends upon resource output expanding at a pace that cannot ever be permanently guaranteed? With these questions clearly before us, it should be possible to find some answers. We should be able to explain how the growth process works and then use the explanation to determine how to modify that process in the West so as to avert any threat to the long-run sustainability of vigorous economic performance.

But our task is not so simple. Our knowledge of what determines the evolution of resource-based economies is rather poor, there being no clear consensus on the subject. However, analysis of various strands of discussion and writings relating to the issue suggests that, in the Canadian context, two broadly contrasting views on it exist, arguably sufficiently distinct and clear-cut to be referred to as "schools of thought." We have labeled them "the resource growth and retrenchment school," and "the growth and evolution school." They provide us with a framework for analysing possible growth and development paths in the West.[1]

Resource Growth and Retrenchment

On the growth and retrenchment view, a region that is distant from major markets, as is the West, grows prosperously only for as long as it has the ability to export natural resources. Once the exports of resources stop increasing, the economy upon which they are based stops growing also. Real income per capita can grow, and reasonably full employment can be maintained, only if population contracts through out-migration. This contraction of population to sustain growth in income per capita is what we mean by "retrenchment."

In this view, continuing prosperity is always contingent upon finding new resources to sell, upon expanding the output of existing ones, upon selling the output at steadily rising prices, or upon some combination of these. Otherwise, the overall gross provincial product will stop growing. If a constant, or even growing, population coincident with rising incomes is desired, then natural resource output cannot just remain level; it must grow steadily.

Viewed from this perspective, the historical growth and economic success of the West has been decidedly fortuitous. Growth has been fostered by the happy chance of a series of expansions led by resources, including wheat and grains, cattle, lumber, oil and gas, coal, potash, and a number of lesser minerals. With wheat and other grains, the added output needed to sustain growth in real income per capita and in population was at first attained through expansion of the land under cultivation; later, growth depended on a steady increase in the output per unit of land and labour. With lumber, steady expansion in the allowable cut has been feasible until now through "mining" the virgin forest. This has permitted growth in income per capita even with a rising population. Growth was assisted by improvements in the output of wood per acre and per person from replanted stands – that is, by productivity growth and a slow, secular upward drift of softwood lumber prices relative to prices in general. Output and prices of oil and gas, coal, and other minerals have risen over the last few decades, similarly providing the basis for growth in the population and in income per capita.

But according to the growth and retrenchment view, resource-based growth carries with it the seeds of its own destruction. Both renewable and non-renewable resources may contribute to it. Renewable resources depend on land; expansion will cease, or at least slow drastically, when the land available is fully exploited. Then growth will be limited to what can be achieved by productivity improvement or price increases in international markets. With limited land, the scope for productivity improvement is seen, rightly or wrongly, as finite; otherwise, as people with this view might say, the world could one day be fed from a flower pot. Nor can international prices be expected to rise permanently in relation to other prices. The upshot is that a stationary, or slowly rising, value of output replaces fast growth, and in order to maintain growth in real income per capita at national rates, the population must contract. Non-renewable resources are similarly subject to diminishing returns; but, in addition, actual exhaustion can occur when unit extraction costs rise above any conceivable world price. Aggregate contraction must ensue; and, again, growth in real income per capita will be sustainable only if population shrinks.

Historically, the process has not been a rapid one. As happened in the West, a series of new exploitable resources can be discovered, maintaining resource-led prosperity for decades or even centuries. But, argues the growth and retrenchment school, in Canada the Maritimes are a classic example of a region that has gone into secular decline because its resources no longer grow rapidly enough to support even a stationary population at a growing level of income. Out-migration is then seen as the only way by which resources per capita can continue to grow. This out-migration will be forced upon the region by higher-than-average unemployment and lower-than-average relative incomes, even though average incomes will grow as fast as elsewhere as a consequence of that very out-migration.

But this view is even more complex, and we must probe a little deeper into why some people think natural resources are necessary for growth. Basically, the idea of the growth and retrenchment school is that a region must have something to sell if it is to survive; the possibility of a large measure of autonomy is rejected. By "surviving" is meant that a region must avoid ultimate disappearance through out-migration, which will occur if incomes are too low relative to those elsewhere. Incomes may be too low if a region has nothing to sell. In that case, the region will not be able to afford the imports essential to maintaining its living standards.

Such imports consist of items the region cannot produce itself, except at such cost in labour and capital that there would be nothing to spare for simple, but essential, local economic activity, such as constructing houses, maintaining retail trade outlets, running local schools, and providing medical care. For example, cars and grapes could be produced in Alberta; but small scale in the first instance and the lack of proper climate and soil in the second would stand in the way. Consequently, more labour and capital (per unit produced) would be needed to manufacture cars or to grow grapes in Alberta than elsewhere. Notice, however, an important and subtle point. If the nontradable goods and service industries, such as local construction, retail trade, education, health care, and public administration, were extraordinarily efficient in their use of labour and capital, it would be possible to produce tradable goods, such as automobiles and grapes, in unlikely places. Because of their efficiency, there would be plenty of labour and capital left over with which to do so, even after having provided for essential local services and construction. Putting this point another way, the cost of living would be so low because of the low price of nontradables that high living standards would be possible despite the low money wages and the profit margins needed to compete with imports and in export markets. It is therefore not simply the locational and scale problems associated with producing tradable goods like grapes and cars that mean a region must have something to sell. It is also the likelihood that the nontradable sector is not significantly more efficient in one region of a country than another. Indeed, in a region of small and sparse population, the service sector is likely to be less efficient than elsewhere. From this discussion we see that salable resources are needed to compensate for three fundamental problems: the lack of a sufficiently large market to exploit scale economies in certain tradable goods, such as cars; a lack of natural locational advantages in the production of other tradable goods, such as grapes; and the lack of a sufficiently unusual degree of efficiency in producing nontradable goods and services. Those who question the growth and retrenchment view (see below) in effect deny that all of these three problems are intractable. But if they are intractable, it will follow that resource growth is essential for growth in living standards without out-migration.

If a region does go into retrenchment because resource growth slows down or stops, the possible policy responses are limited by the very nature of the problem. If growth in the volume of resource production is essential when the population is stable or rising, the best policy would ensure that all commercially exploitable resources were found and used. Since it is usually in the interests of business to do this anyway, the role of government would be limited to filling in the gaps. These gaps could be rather substantial and cover a wide field. For example, policy might be implemented to ensure that institutional arrangements for forestry exploitation would maximize the real income yield from the forestry; to negotiate higher prices for exports and resources, such as natural gas; to modify land tenure arrangements; to settle long-term contracts; to work out more efficient rent-collection techniques; or to design better transportation policies. Ultimately, however, policy must recognize that out-migration is the only long-run antidote to retrenchment.

Undoubtedly, this growth and retrenchment view permeates the consciousness of many Canadians. Many see this prospect as a logical corollary of the views of Canada's most illustrious economic historian, Harold Innis, who closely traced the links between growth and development in Canada and the increasing exploitation of key natural resources, such as fur, cod, and wheat. Politically this view is unpopular, since it forebodes unpleasant change as the inevitable and irresistible result of long-run economic forces. But will this ever come to pass?

Some would deny the truth of the growth and retrenchment school. They argue that continuing

growth in both the volume and value of resource output is possible through technological change in the resource industries – for example, through developments that would increase the volume of nonrenewable resources produced by improving the efficiency of the exploration process and of extraction from known deposits and by making formerly uneconomic resources economic.

This group believes that technological change would also lead to continuous increases in the yield of renewable resources. There is little historical evidence, they say, of ceilings on the volume of output having been reached in natural resource industries. Nor is there any reason to suppose that indefinite productivity improvement will be any harder to maintain in those industries than in other areas of economic activity. Going still further, they argue that achieving continuous growth in productivity in natural resource industries is no more fortuitous or risky than in any other industry. Productivity growth in these industries is, they say, subject to precisely the same economic forces that generate productivity improvement in other areas, as individuals seek economic success, whether they define it in terms of profits, power, or security.

In sum, these people aver, the argument that it is harder to sustain indefinite growth in natural resources than in other products is historically and logically false. They concede that some policy action may be needed to guarantee the growth that is necessary in the resource sector, but they say that that is equally true of other sectors and other economies where natural resources are not a key element of growth. Thus this group denies the retrenchment aspect of the growth and retrenchment view, while still asserting the primacy of natural resources for western development.

Resource Growth and Evolution

Others are sceptical of the growth and retrenchment school for different reasons. The proponents of the growth and evolution school claim that even if a region obtains its start by exporting natural resources, it can sustain prosperity by developing other exports or import substitutes or, more subtly, through adequate growth in the nontradable sector. Resources remain valuable to this school, but they are not considered essential for maintaining growth in real income per capita even when the population is expanding. They cite as evidence some countries, such as Japan and West Germany, that have always managed to grow rapidly with only few resources.

Proponents of the growth and evolution view insist that if resources can be exploited long enough to increase the population of a region significantly, the local market may become large enough that scale economies in manufacturing will permit import replacement or even entry into the world market as an exporter. The necessary investment can be obtained externally or internally through accumulated past resource rents. To the extent that such developments occur, the need for resource exports to pay for manufactured imports will be lessened. Moreover, as the population and its density grow, the nontradable sector will become more efficient through the development of what are called agglomeration economies, including scale, density, and network effects. Although the nontradable sector is unlikely, except by chance, to become more efficient in the West than in other regions that have larger and denser populations, the efficiency gap may close entirely or almost, thus contributing forcefully to diminished dependence on resource exploitation. The whole process will be further reinforced by the increasing relative demand for services as real incomes rise, which in turn will contribute to a diminished need for imported goods and also to a reduced dependence on exported resources.

The picture then is one of resource-driven growth initially, followed by expanding population and population density, and by a shift in demand caused by rising real incomes, bringing the economy to the point where growth in resource output is less necessary for growth in living standards and population than it used to be. The three "fundamental" problems cited earlier are not, in this view, impossible to overcome. It will always be necessary to have some locational resource advantage if living standards are to be comparable to those in other places, in order to compensate for not having some other location-specific product. But population and real income growth may bring a region to the point where further real income growth can be sustained with a constant, or even rising, population, despite slow or no resource growth, on the basis of growing efficiency in the other tradable-goods and the nontradable-goods and services sectors. The chances of such an evolution may be enhanced if transportation and other communications become cheaper through improvements in productivity and if world trade barriers fall. Both of these forces are currently at work.

The Ontario economy provides an example of the growth and evolution concept. Although based initially on natural resources, Ontario's economy has grown to the point that while natural resources still play an important role, they are no longer more fundamental to the economy than other kinds of economic activity.

But even with this example, the factors that determine whether an economy has evolved from

resource-dependent growth to nonresource-dependent growth or has simply gone into retrenchment are not well understood. The size and density of the population achieved during the resource growth period must matter. But no one knows just what size range of population or density is critical; whether that size varies through time; and what other factors affect it – such as entrepreneurship, capital investment, efficiency of the internal and external transportation system, education and the quality of the labour force, research and development or technical change, and sheer luck. Similarly, the increased demand for services as real incomes rise must matter, as must the degree to which productivity improvement in services is possible. But even a good list of relevant factors eludes us at this stage of economic knowledge. Nevertheless, the possibility of growth and evolution, as opposed to growth and retrenchment, for the future of an initially resource-dependent area cannot be gainsaid.[2]

Suppose for the moment that the growth and evolution path was the future for the West, or a possible future. What would be the appropriate policy responses? They are somewhat limited, though not as limited as in the growth and retrenchment case. If one knew the precise population size and density at which scale and agglomeration economies, when coupled with other manufacturing and service sector developments, could be relied upon to compensate for the diminishing growth of natural resources, it might be possible to encourage migration to reach that size and density. We do not know that size even approximately, however, so that any such policy might well prove to be not just ineffective but positively counterproductive if retrenchment were the wisest long-run policy from the point of view of the economic welfare of individuals. Moreover, with the possible exception of the cunning use of Heritage Funds, there are no effective policy instruments available for changing population size and density.

The possibility that growth and evolution may be the appropriate development path in the West does, however, widen the range of possible policy actions. Policies to ensure maximum income growth from the resources available will still make sense, but further actions will also be reasonable. Manufacturing may also warrant policy attention. Infant industries could conceivably, by increasing population, create the very size of market that would make them cost-competitive. Even more important, since growing out of dependence on resources is in part contingent upon using labour and capital effectively in the nontradable sector (mainly services and construction), it will be important to verify whether private business can be expected to exploit all the opportunities for increasing efficiency there. If not, some ancillary policy action may be worth while. As just one example, perhaps provincial action to increase R&D in the local transportation industry would be appropriate. The evolutionary view of growth thus widens the policy perspective to cover the service sector – the 60 per cent of the economy that is not resources or other internationally or interregionally traded goods.

The Potential for Policy Conflicts

There is a potential for policy conflicts between the two schools, although most policies that are wise under one view will be wise under the other as well. For example, policies to compensate for market failures in areas such as soil conservation or intensive forest management and investment in human resources offer no conflict. The importance of knowing about the different approaches is not that they have radically conflicting policy implications; it is that the growth and evolution school implies much broader scope for policy than the growth and retrenchment school and also more grounds for optimism about the long-run future.

Conflicts would occur, however, over the part that policy should play in stimulating in-migration or out-migration. Policies that inhibit out-migration would be foolish if retrenchment were a possibility, but wise if evolution were the path. Similarly, policies that subsidize the manufacturing industry with a view to replacing jobs lost through lost resource production make no sense under retrenchment, but they might if the population grew sufficiently, as a result, to generate agglomeration economies. The question of subsidizing further processing when it would not be commercially viable is more subtle. Policy to make resources last longer or to support a larger population while they do last, or both, would simply delay the inevitable adjustment and at the cost of lowering living standards. Ironically, according to the growth and evolution view, the policy could be productive if it were used to augment population rather than simply extend the time that a given population could be supported.

The relative importance of potential policy conflict should not be exaggerated. Conflict would occur mainly when policy was aimed at subsidizing the movement of population or capital into a region. Many policies do not have this aim and would make sense either way. Thus, to add to the two examples above, more efficient administration of property rights to forestry and fishing, proper levels of R&D, appropriate negotiating policies on international trade in primary products – both generally and in the area of countertrade in particular – good design of transport facilities and rate structures, and much more, would

all be appropriate policies to defer the ultimate end of growth or to foster evolution into self-sustaining growth.

Our Approach

From the evidence it is not yet possible to decide which view applies to the West of today. Some of the evidence in later chapters suggests that agglomeration economies in Canada are real enough, as is the growing relative size of the service sector and the consequent decreased dependence on resource exports. The more rapid development of western manufacturing is heading in the same direction. At the same time, we have insufficient quantitative evidence to judge whether all of these effects are strong enough to offset the potential inability of natural resources to sustain a growing population while real incomes are rising. Nor, to our knowledge, does any *direct empirical evidence* – as opposed to logical inference – favour out-migration to sustain living standards in the face of an inadequate resource base. Thus it is necessary to develop policies somewhat in the dark. Fortunately, many policies can improve economic performance in the West regardless of the long-term outlook. For others, a judgment will be necessary.

But the ultimate sustainability of satisfactory growth in population and income in the West is not the only issue of importance in policy making, though it is obviously a major one. Most policy issues bear on this issue directly or indirectly, but they also matter in their own right; for example, questions about transportation, income distribution, instability of farm incomes, international trade, property rights, and the distribution of federal revenues and expenditures are all important for the West. We deal with many of those issues in this report, for they often arise in connection with our deeper concern about long-run development. We hope thereby to contribute to both the resolution of a number of short- and medium-term western problems and the long-run sustainability of western prosperity.

5 The Forest Industry*

The forest industry of Canada has been the object of increasing concern because of doubts about its ability to sustain regional growth. The spectre of timber supply shortages and of a possible decline in world demand for Canada's forest products has raised fears that the multibillion-dollar forest product industry could face stagnation or even an absolute decline in importance in coming years.

These fears are not new. In 1871, Sir John A. Macdonald wrote: "We are recklessly destroying the timber of Canada, and there is scarcely a possibility of replacing it." Nearly 40 years later, at the 1908 meeting of the Canadian Forestry Association, Elihu Stewart warned that "we, like the miner, fail to realize that we have reached our last west; that nature so prolific to this country in this respect has no more virgin fields to offer; and that the only means by which a supply can be maintained to meet the enormous demands of future years is by husbanding the resources of the territory we are exploiting."

Each generation tends to fear that it is "running out of timber," but the current expressions of concern appear to be more justified than in the past. The fundamental policy question that arises in the context of this report is whether the forest industry in the West can continue to sustain or promote economic growth in the region. Are the fears about the long-term viability of the industry and its ability to contribute to incomes in the West justified? Are current forest management policies appropriate? Does the current mix of regulation and market forces enable the forest industry to contribute as much as it could or should to the economic welfare of the citizens of the West through time?

The forest industry includes two major sectors: the forestry (or logging) industry, which produces unprocessed logs; and the wood-processing industries – wood products, and paper and allied products (mainly pulp and paper mills). The production relationships, industrial structure, and reliance on domestic and export markets differ in these industries. Even within a province, there are significant variations between regions. For example, differences in the species composition of the forests and in the quality of tree stands in terms of timber height and diameter, as well as institutional differences in the pricing of timber, have led to significant differences in the productivity and output mix of the coastal and interior logging and sawmilling industries of British Columbia.

Our focus in this report is on the logging industry in British Columbia. We have selected the logging industry because we believe that it is the characteristics of the forest base – the quantity and quality of timber – combined with various government policies (especially those aimed at promoting the further processing of logs) and with market prices, that determine the location and volume of production in the wood-processing industries in the West. We think that the logging industry, with its complex mix of market and regulatory forces, is the key to ensuring that the forest industry as a whole will operate efficiently and make the greatest possible contribution to regional incomes. In our view, if some relatively modest changes were made to the current institutional structure in forestry, they could yield significant gains in incomes in the West.

Our focus on British Columbia stems from the fact that the forest industry is the single most important industry in that province in economic terms. And, although the forest management structure that has evolved in British Columbia has flaws, it still represents a standard that other provinces in the West and in the rest of Canada might do well to emulate.[1]

The issue of the longer-run viability of the forest industry in Canada – and, in particular, in the West – cannot be examined without analysing the institutional and market environment in which the industry currently operates. The salient feature of that environment in the West is the pervasive government regulation of the logging industry. The provincial governments in the region own an overwhelming proportion of the forests. They have adopted a variety of measures aimed at allocating the rights to "harvest" the timber, determining the allowable annual cut (i.e., the harvest level consistent with a sustained yield from the forest base) for the various timber management units, and specifying the procedures for determining the price of standing timber; in addition, they set timber utilization standards and reforestation requirements. In some provinces, the available market for timber is virtually determined by regulation. Thus the viability of the forest industry in the West (and in the

*Mr. Douglas P. Thomas disagrees with the basic thrust of this chapter. See his comments after Chapter 14.

rest of Canada) is inextricably linked to the implications of current forest management policies for efficient resource allocation and the distribution of income. These policies influence both the rate at which the current timber stock is depleted and the level of investment in future supplies.

The Industry's Prospects

Supply

The possibility that Canadian timber production may not rise as rapidly in the future as it did in the past – or, worse, that it may decline significantly – has increasingly become the focus of public policy discussions. Canada's forest base, especially in the West, consists largely of mature (or "old-growth") timber stands. Once depleted, these stands cannot be replaced – at least under basic silvicultural practices[2] – unless society is willing to wait the two or three centuries required to regenerate stands of equal volume.

A number of recent studies by the federal and provincial governments and by private groups have expressed pessimism about the sustainability of current harvest levels and about their further expansion in the absence of significant amounts of investment in the timber base.[3] The most detailed and sophisticated of these analyses, insofar as they relate to the western provinces, is the 1980 study prepared by the B.C. Ministry of Forests.[4] It predicted that the volume of timber that the Crown had contracted to supply in the province in 1977 could not be sustained in the future if the existing level of expenditures on regeneration and protection of the forest remained unchanged. The study forecast a decline in the B.C. timber supply to two-thirds of current levels, once the stock of old-growth timber had been fully harvested and the industry was forced to rely upon second-growth stands, and after account had been taken of a possible 25 per cent reduction in the forest base over the next 20 years. The "falldown" in the aggregate provincial harvest lies perhaps 75 years ahead, but the study forecast that at current harvest levels, shortages would occur within five to ten years in local districts in seven out of eight of the Ministry's "timber management units." Any increase in harvesting above the 1977 levels was expected to bring forward the timing of the falldown of the total provincial harvest and increase its severity. The provincial government responded to these forecasts by freezing the maximum harvest level at 75 million cubic metres (the 1978 level) until 1985 and proposing a five-year, $1.4-billion "forest and range reserve program" that included larger allocations for intensive forest management practices. However, the fiscal restraint program recently adopted in British Columbia has led to a significant reduction in these proposed expenditures.

The structural factors leading to the falldown in British Columbia also apply in the Prairie provinces, as they do in any region that is engaged in liquidating first-growth timber and faces competing demands upon a shrinking timber base. For the Prairie provinces, however, the reduction in the forest base is not expected to be as extensive as that predicted for British Columbia.

Demand

The current public debate on timber supply issues should not be allowed to conceal some potentially serious demand problems. Recent market conditions have forced the forest industry to reduce its output well below the peak levels reached in 1979. For example, primary forest production in the West amounted to 72,724 thousand cubic metres in 1981, compared with 87,885 thousand cubic metres in 1979.[5] Although the recent fall in demand may only be cyclical, there are potentially serious problems that could affect the long-term demand for the West's forest products.

The emergence in Africa and South America of tree plantations specializing in rapid-growth and high-yield trees could pose a major long-run challenge to the West's forestry industry, especially as the region moves away from exploiting virgin timber stands and becomes more dependent on second-growth timber. If new, lower-cost sources of timber supply continue to emerge in other countries and the world consumption of various forest products does not increase as rapidly as it did in the past, the resulting decline in world prices could prevent producers in western Canada from operating profitably within their existing cost structure.

The extent of the difficulties that domestic producers will face in maintaining their traditional export markets is difficult to predict. It will depend in part on the degree to which the volume of lumber exports reflects any unique attributes of the mature timber stands of British Columbia. For example, with its physical characteristics – colour, board or beam size, texture – virgin timber may be able to command a price premium over second-growth timber. And when the stock of mature timber is depleted, the marketing of second-growth timber may be more difficult. Moreover, since harvesting and processing costs generally decline with greater timber size – in terms of diameter and length – production costs may rise with the transition to second-growth timber, unless harvesting and processing technologies suitable for smaller timber are adopted. Transportation costs and the exchange rate are other factors that will play a

critical role in maintaining or expanding the West's export shares in foreign markets.

The forest industry could also face major problems in its largest market, the United States. In particular, there will be increasing competition from expanding forestry production in the U.S. South and from imports from other countries. Increased investment in intensive forest management in the United States could, by the year 2030, lead to the elimination of softwood lumber imports from all sources, including Canada.[6] Thus the demand for the West's forest products (especially those of British Columbia) may not grow as rapidly as was predicted in the late 1970s, and it could even decline significantly.

Another problem is the possibility of restrictions by the United States on imports of Canadian lumber. Logging operators in the Pacific Northwest and elsewhere in the United States have asked federal authorities in Washington to impose countervailing duties on softwood lumber imports from Canada. Their basic grievance is that the prices of standing timber (the "stumpage") in British Columbia are determined institutionally and set at rates well below those paid by U.S. producers, who bid competitively for stumpage. They argue that the lower stumpage fees constitute an implicit subsidy to B.C. lumber producers and effectively provide them with a significant cost advantage in U.S. markets. While all attempts to restrict imports of Canadian softwood lumber have failed so far, there remains the possibility that industry lobbying in the United States will eventually be successful, especially if the Canadian share of the U.S. market rises above current levels.

The Issues

The factors affecting the long-term supply of, and demand for, the West's forest products – especially softwood lumber, since hardwood production is of minor importance in the West – could force the industry to reduce production levels well below the peak levels attained in 1979, when the output reached 76.2 million cubic metres, from 34.0 million cubic metres in 1960 and 54.7 million cubic metres in 1970. Certainly the B.C. government's decision to fix a maximum harvest level for the province is consistent with the assumption that the era of rapid extensive growth of the industry is over. Because the forestry industry is of critical importance to the B.C. economy, a decline in that industry could well lead to a slowdown in overall economic activity in the province relative to the rest of Canada. Naturally, the outcome also depends on the existing institutional framework in forestry itself and on its ability to respond to the type of challenges described above.

Some observers have criticized the policies aimed at determining the timing of timber harvesting, not only in the West but in most provinces where governments regulate harvesting. The provinces have sought to ensure a sustained yield of timber from the forest base. Criticism of that policy has generally been twofold. Some have argued that the primary goal of the policy – the long-term stability of regional incomes and employment – may not be a valid social goal and that, even if it is, there are other, less costly ways of achieving it. Others implicitly accept sustained yield as an end in itself but focus on the criteria used to determine the timing of harvesting. They maintain that the use of a biological (or "physical") criterion to determine the timing of harvests leads to significantly lower levels of stumpage and provincial resource revenues than if an economic criterion were used.

There are other issues as well. The relatively short duration of tenure rights (compared with that of the harvest cycle) and a lack of financial incentives could lead to a lower level of investment in intensive forest management practices than is socially desirable. As a consequence, these factors could significantly reduce future harvest levels below their potential level. In addition, the *de facto* embargo on the export of unprocessed logs from British Columbia has reduced the value of the forest base far below its maximum level and may have affected the industrial structure of the provincial economy. Finally, some observers believe that the manner in which the provincial government values and charges for the right to harvest standing timber is inappropriate. It has been suggested, for example, that the timber appraisal system is flawed and that, as a result, the Crown does not capture all of the returns to the forest base – the "economic rent" – to which it is entitled as the resource owner.[7]

The Economic Importance of the Industry

The forest industry as a whole is the single largest industry in British Columbia, forming the economic base of the province: in 1980 the industry accounted for 13.3 per cent of provincial GDP (in current dollars at factor cost), approximately 10 per cent of the provincial labour force, 50 per cent of the value of shipments in B.C. manufacturing, and 60 per cent of the province's exports. The forest industry is far less significant in the Prairie provinces. In 1980 it accounted for 1.0 per cent of employment in Alberta, 0.5 per cent in Saskatchewan, and 1.1 per cent in Manitoba.

Among the provinces, British Columbia is the single largest producer in the logging and wood product

industries, and the third largest, behind Quebec and Ontario, in the paper and allied products industry (Table 5-1). Similarly, British Columbia has the largest share of employment in logging and wood products, but it accounts for a relatively small share in the paper and allied products industries, compared with Quebec and Ontario.

Although the forest industry makes a large contribution to British Columbia's employment and real GDP, its direct contribution to provincial revenues is surprisingly small (Table 5-2). Since 1975, provincial revenues from the forest industry have been less than those from petroleum and natural gas in all years but one. Stumpage fees and royalties for the removal of timber from the share of the forest base owned by the B.C. government have been by far the largest source of forest revenue. In 1979 they accounted for 66.5 per cent ($457.7 million) of the provincial government's revenues from the forest. The contribution to revenues in the other western provinces has been much smaller.

There are wide variations in the timber-producing capacity of forests in the West both within and between provinces (Table 5-3). The greatest variation occurs in British Columbia, where the coastal zone has a productivity level almost three times that of the

Table 5-1

Regional Distribution of Value Added in the Forest Industry, Canada, Selected Years, 1965-80

	Atlantic provinces[1]	Quebec	Ontario	Prairie provinces	British Columbia	Canada
			(Per cent)			($ Millions)
Logging						
1965	10.0	24.8	16.0	2.0	47.1	546.7
1970	9.7	23.2	16.1	2.8	48.2	694.0
1975	10.7	27.4	15.7	5.3	40.9	1,125.5
1980	8.9	17.0	15.6	3.4	55.1	2,048.7
Wood products						
1965	5.4	18.8	18.3	6.3	51.2	668.9
1970	5.4	19.8	19.0	8.2	47.6	801.8
1975	4.8	22.3	18.1	9.4	45.2	1,689.6
1980	4.3	21.8	16.2	8.3	49.3	3,465.7
Paper and allied products[2]						
1965	4.3	35.1	34.5	1.6	18.2	1,364.6
1970	4.1	34.0	33.8	1.6	19.6	1,817.0
1975	6.2	30.9	28.8	2.4	23.0	3,469.8
1980	5.4	31.8	29.4	2.2	22.5	6,770.1

1 The 1975 data for wood products exclude Prince Edward Island.
2 For the Prairie provinces, the data refer to Alberta only; for the Atlantic provinces, they refer to New Brunswick only.
SOURCE Based on data from Statistics Canada.

Table 5-2

Contribution of Forests and Natural Resources to Gross General Provincial Government Revenue in the West, Canada, Selected Years, 1970-80

	Manitoba		Saskatchewan		Alberta		British Columbia	
	Forests	Natural resources	Forests	Natural resources	Forests	Natural resources	Forests	Natural resources
				(Per cent)				
1970	0.1	1.6	0.2	7.1	0.4	21.6	4.9	9.2
1975	0.1	1.9	0.2	21.9	0.1	48.1	2.0	6.6
1979	0.1	2.2	0.2	25.4	0.1	55.2	9.6	15.7
1980	0.1	2.3	0.1	28.6	0.1	51.5	6.9	12.5

SOURCE Based on data from Statistics Canada.

southern and central interior zones and almost five times that of the northern interior. The variations between provinces, although less extreme, are still significant. The average productivity of the B.C. forest base, for example, is more than twice as high as Saskatchewan's. The magnitude of these disparities, particularly within provinces, suggests that any regulatory framework must be flexible if it is to be equitable within and between regions; at the same time, it must safeguard the proprietary interests of the province.

Table 5-3

Productivity of the Forest Base in Western Canada, Measured in Terms of Average Timber Volume

	Mean annual increment[1]
	(Cubic metres per hectare per year)
British Columbia	2.03
Zone 1 (The Coast)	5.32
Zone 2 (Southern interior)	1.82
Zone 3 (Central interior)	1.82
Zone 4 (Northern interior)	1.12
Alberta	1.75
Zone 1	2.03
Zone 2	1.75
Zone 3	1.40
Saskatchewan	0.99
Zone 1	1.17
Zone 2	0.98
Zone 3	0.85
Manitoba	1.54
Zone 1	1.26
Zone 2	1.61
Zone 3	1.61
Zone 4	1.05

1 Total stand volume averaged over stand rotation age.

SOURCE F.L.C. Reed and Associates Ltd., *Forest Management in Canada* (1976), vol. 1, Chapter 3.

Exports

British Columbia's exports of forest products are significant in the world context (Table 5-4). Moreover, they constitute approximately 40 per cent of Canada's total exports of forest products, thus highlighting the importance of exports to the forest industry of the province.

The exports of forest products from British Columbia are overwhelmingly composed of softwood lumber and paper and allied products. Government restrictions on the export of unprocessed logs effectively limit the logging industry to providing raw resources for processing in the wood products industry and the paper and allied products industry. From 1972 to 1979, only 0.9 per cent of the total roundwood harvest, on average, was exported annually from the province, while the rest was used as an input into the processing sectors of the forest industry.

Because of its proximity to the United States and of the magnitude and quality of its forest base – and because there is virtually unrestricted free trade between Canada and the United States for softwood lumber – British Columbia is the largest source of Canada's softwood lumber exports to our neighbours to the south. At the same time, the United States is the largest market for B.C. forest products, as is

Table 5-4

Exports of Forest Products from Major Exporting Regions of the World, 1965-81

	1965	1970	1975	1980	1981
			(Per cent)		
North and Central America	33.9	35.0	32.8	31.6	33.1
Canada (excl. B.C.)	15.1	12.5	10.7	10.1	12.3
British Columbia	8.9	9.3	8.2	8.7	7.9
United States	9.6	12.9	13.6	12.6	12.7
South America	1.4	1.5	1.5	2.7	2.8
Europe (excl. U.S.S.R.)	45.7	42.8	44.7	44.3	43.6
Soviet Union	7.2	6.7	7.2	4.8	5.2
Asia	7.5	10.1	10.2	12.9	11.5
			(Millions of $U.S.)		
Value of world exports	8,062.5	12,563.8	25,838.8	54,571.9	51,326.0

SOURCE United Nations Food and Agriculture Organization, *Yearbook of Forest Products*, various years; and British Columbia, Ministry of Finance, *Financial and Economic Review*, various years.

shown by the pattern of British Columbia's lumber shipments. In 1978, the peak year for B.C. lumber shipments, 65.1 per cent of these shipments went to the United States and only 7 per cent to the rest of Canada. The trend since 1978 has been towards a lessening of the dependence on the U.S. market and an increase in the importance of the Japanese and European markets.

As for newsprint, 88 per cent of the province's production was exported abroad in 1977. The situation is somewhat different for plywood and other wood products involving greater processing, because many of Canada's major trading partners provide varying degrees of protection for their domestic producers of wood products through tariffs. Consequently, these industries rely more on Canadian markets, which accounted for 89 per cent of British Columbia's plywood shipments in 1977. A similar pattern of trade exists for the forest industries of the Prairie provinces. They rely heavily on U.S. markets for lumber and newsprint shipments; for wood products requiring more processing, the domestic market is far more significant.

The Long-Term Contribution to Growth

An examination of the effective production capacity of a given forest site involves a number of concepts related to harvest levels and timber reserves. The *annual allowable cut* is the regulated yearly harvest for a forest management unit under the sustained-yield criterion, or the annual harvest authorized by a licence over its term. The current level of the annual allowable cut may not be sustainable indefinitely if the industry is still harvesting old-growth timber. The *actual harvest* represents the volume of timber effectively removed from the forest base. The difference between the actual and allowable harvest levels represents the *theoretical reserve* available for further expansion of the industry. The theoretical figure must be adjusted downward to take into account sites that are unlikely to be harvested profitably because of their remoteness or high elevation, the low volume per hectare, the poor quality of the stands, small log diameter, unattractive species mix, site fragility, or poor prospects for reforestation.[8] The resulting *realistic reserve* takes into account economic accessibility and the possibility of future removals from the forest base.

The data on softwood timber suggest that both British Columbia and Saskatchewan have reached their effective production ceiling (Table 5-5). It is also apparent that Alberta possesses a significant potential for further expansion of softwood production – that potential being almost double the 1979 harvest level – and that its realistic reserve constitutes the bulk of the potential available for the expansion of softwood lumber in Canada as a whole.

The evidence that there is little potential for expansion of timber production in British Columbia is all the more serious in its implications for the provincial economy in view of the historical data on timber production by region (Table 5-6). Total timber production grew at about 3.7 per cent annually from 1912 to 1979; an acceleration of growth occurred in the 1960s, resulting in a rate of 4.3 per cent for the 1960-79 period. This rapid growth was accompanied by a geographic shift in production, with the interior zone becoming increasingly more significant. Since 1972, the interior has provided the largest share of timber production, and that share has been increasing. The rapid expansion of timber production has been accompanied by a corresponding increase in lumber and pulp and paper production.

The B.C. Ministry of Forests has provided a range of estimates to the year 2000 of the potential

Table 5-5

Softwood Timber: Annual Allowable Cut, Actual Harvests (1979), and Apparent and "Realistic" Timber Reserves in Western Canada

	Annual allowable cut	Harvest in 1979	Theoretical physical timber reserve	Realistic reserve
	(Millions of cubic metres)			
Manitoba	5.4	1.6	3.8	0.9
Saskatchewan	3.9	2.4	1.5	-
Alberta	14.6	6.7	7.9	6.1
British Columbia	99.4	76.0	23.4	--
Canada	205.2	149.9	55.3	6.4

SOURCE *Proceedings of the Canadian Forest Congress* (Toronto: 1980); and F.L.C. Reed and Associates, "Recent Reductions in the Canadian Timber Base," *The Forest Imperative*, a publication prepared for the Canadian Pulp and Paper Association (1980), Appendix IV.

Table 5-6

Timber Production in British Columbia, Selected Years, 1912-81

	The Coast	The Interior	Total
	(Millions of cubic metres)		
1912	5.0	1.7	6.7
1920	7.6	2.3	9.9
1930	10.6	2.1	12.7
1940	15.7	1.9	17.6
1950	16.4	5.6	22.0
1955	18.6	10.7	29.3
1960	19.9	14.1	34.0
1965	24.3	19.1	43.4
1970	28.8	25.9	54.7
1972	24.7	31.8	56.5
1973	32.7	37.4	70.1
1975	21.4	28.7	50.1
1976	32.2	37.3	69.5
1977	28.6	41.4	70.0
1978	32.4	42.8	75.2
1979	30.6	45.6	76.2
1980	30.7	43.9	74.7
1981	22.5	37.0	59.5

SOURCE British Columbia, Ministry of Forests, *Forest and Range Resource Analysis: Technical Report* (1980), vol. 1, p. 1; and Council of Forest Industries, "British Columbia Forest Industry: Statistical Tables," April 1982.

demand for provincial timber.[9] These estimates are conditional upon a number of factors whose future influence is difficult to predict with any degree of precision. Among the most important are the demand for all forest products, the productivity of the forest industry, transportation costs, and the exchange rate.

The "most likely" timber harvest in 2000 is forecast at 91.1 million cubic metres. This level represents an average annual growth rate of 1 per cent from projected and actual forest levels in 1980, which is well below the rate observed from 1912 to 1980. The projected growth to 2000 is not uniform, as demographic factors in the United States after 1985 are expected to have an adverse effect on the demand for forest products after 1985. The timber harvests required to satisfy the upper and lower estimates of the demand for forest products in 2000 are 98.1 and 84.2 million cubic metres, respectively.

The external demand for B.C. timber derives almost entirely from the wood products and paper and allied products industries, since government restrictions effectively preclude the export of unprocessed logs. The production and export of lumber to the United States are the most important determinants of demand. In 1977, 80.3 per cent of the B.C. timber harvest was converted to lumber, and 64.5 per cent of B.C. lumber shipments were destined for the United States. The Ministry's "most likely" demand scenario for 2000 predicts that the production of lumber will represent 75.6 per cent of the timber harvest and that the United States will absorb 59.6 per cent of the province's lumber shipments.

The production of the other main components of the wood product industry – plywood and veneer – accounted for 7.3 per cent of the B.C. timber harvest in 1977, and that share is expected to rise to 8.2 per cent by 2000. The external demand for these products is, however, expected to grow far less rapidly than in the past. From 1955 to 1977 plywood shipments grew at an annual rate of 5.2 per cent, whereas the "most likely" forecast to 2000 is a rate of 1.7 per cent per annum. The domestic market will remain the most important, although the volume of exports to the United Kingdom is predicted to increase substantially.

Pulp, paper, and newsprint production accounted for 8.5 per cent of the provincial timber harvest in 1977; this share is forecast to rise to 10.5 per cent by 2000. The United States will remain the single most important market for B.C. newsprint, although exports to the U.S. market as a share of production are expected to decline from 68.3 per cent in 1977 to 59.1 per cent in 2000. Bleached sulphate pulp shipments are thought to have a significant potential for market expansion and are expected to reach 4.2 million tonnes in 2000, compared with 2.7 million tonnes in 1977. Europe is expected to remain the single most important market, accounting for almost 50 per cent of B.C. bleached sulphate pulp shipments throughout the period to 2000.

The estimates of the timber harvest required to satisfy the various demand scenarios for forest products assume that the provincial timber supply is perfectly responsive to increases in demand. Such responsiveness is highly unlikely, however, because the B.C. forest base is finite, and a long time horizon is required to augment timber supplies. The purpose of the exercise, from the Ministry's perspective, was to assess the potential of the forest base to meet these anticipated timber requirements. The findings were that, given present levels of investment in the forest base, not even *current* levels of timber commitment – let alone *future* higher levels – could be sustained. Thus it is clear that the availability of timber supplies could be a much greater constraint on future production in British Columbia than it was in the past, when timber production was believed by some observers to be constrained only by demand. The importance of this issue is made clear when forecasts of timber production that take into account both supply and demand constraints are examined.[10]

The demand scenarios for British Columbia's forest products are very sensitive to assumptions about

domestic production in the United States. The U.S. Forest Service forecasts that timber demand in that country will grow faster than supply and that the prospective timber deficit will be greatest for softwood.[11] As a consequence, softwood lumber prices are projected to increase at an annual rate of 1.7 per cent in real terms (in 1967 dollars) – a figure that is consistent with the historic growth trend of approximately 1.5 per cent annually. The price of standing softwood timber is also expected to rise in real terms at rates ranging from 1.8 per cent annually in the Douglas fir region of the U.S. Pacific Northwest to a high of 3.8 per year in the Rocky Mountain region. Imports of timber will increase, with the roundwood equivalent of the forest product imports from Canada and from the tropical hardwood forests rising from 3.2 billion cubic feet in 1977 to 4.5 billion cubic feet in 2010, when imports will level off. The ability of Canada, particularly British Columbia, to meet this anticipated increase in demand hinges critically on timber availability within the province and on the cost structure of the industry, relative to competing sources of supply. This latter point – the relative cost competitiveness of the B.C. industry – is of fundamental importance.

A recent study has suggested that increased investments in intensive forest management by private timber owners in the United States, especially in the South, could have a devastating impact on Canadian exports of softwood lumber to that country, with Canada's share falling to zero by 2030![12] Underlying this prediction is the apparent assumption that the intensity of management of forest lands in Canada – especially in British Columbia – will remain at current levels even as an intensive forest management regime is adopted in the United States. It is also assumed that nonindustrial timber producers in the U.S. South will readily adopt intensive forest management practices. These assumptions may seem extreme, but the study highlights the potential importance of proper responsiveness by the regulatory framework in British Columbia to the benefits and costs of investment in intensive forest management. The "baseline" scenario, which holds the intensity of U.S. forest management at present levels, predicts that Canada's share of total new supplies of softwood lumber in the United States will be 23 per cent.

The other factors that are of critical importance to market opportunities for forest products from British Columbia and the West are transportation costs and the exchange rate. In January 1982 transportation costs accounted for 38 per cent of the delivered price of spruce lumber in Chicago, 42 per cent in Dallas, and 41 per cent in Atlanta.[13] Clearly, investments aimed at removing bottlenecks and improving the efficiency of the rail system, as well as ensuring the continued access of the industry to low-cost foreign ocean carriers, will be essential if the industry is to meet the marketing challenges that lie ahead. As for the exchange rate, it is important to the forest industry because it is one of the determinants of the export price of Canada's forest products. An appreciation of the Canadian dollar increases the price of Canada's forest products and reduces their competitiveness in world markets, especially in the United States when they are compared with production in that country. The converse is also true, as shown by the surge in British Columbia's exports of softwood lumber to the United States from 6.2 billion board feet in 1976 to 8.4 billion board feet in 1978, which resulted in part from the depreciation of the Canadian dollar from $0.99 to $1.14 per U.S. dollar.

Forest Management Policies

The issue of the long-run viability of the forest industry can only be discussed in the context of forest management policies. The incentive for firms to invest in new techniques to improve the productivity of the forest base – for example to adopt intensive forest management practices – depends not only on the projected future supply of, and demand for, forest products but also on the manner in which the current institutional framework distributes the costs and benefits of these investment projects.

Section 4 of the Ministry of Forests Act sets out the broad objectives of government forest management policies in British Columbia:

a) to encourage maximum productivity of the forest and range resources in the Province;

b) to manage, protect and conserve the forest and range resources of the Crown, having regard to the immediate and long term economic and social benefits they may confer on the Province;

c) to plan the use of the forest and range resources of the Crown, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with other ministries and agencies of the Crown and with the private sector;

d) to encourage a vigorous, efficient and world-competitive timber processing industry in the Province; and

e) to assert the financial interest of the Crown in its forest and range resources in a systematic and equitable manner.

The apparent intent of the legislation is that the Ministry manage the forest base on behalf of its

collective owners – the residents of British Columbia – in a manner that maximizes its full social value through time. A separate piece of legislation, the Forest Act, provides for the institutional structure regulating the industry. It details the various forms of forest tenure, provides the Chief Forester with the responsibility for setting allowable annual cuts, and requires the payment of royalty, rent, or stumpage fees. Unfortunately, while the legislation sets out the goals and framework of regulation, it does not contain precise criteria for setting harvest rates or determining the value of standing timber. In large part, the criteria are determined administratively.

Forest management in British Columbia, as well as in the Prairie provinces, attempts to satisfy the dual role of the Crown as regulator and proprietor of the forest base. Only British Columbia, however, has so forcefully articulated what the goals of management ought to be.

Regulation

The Ministry of Forests Act and the Forest Act allow the provincial government to intervene in the operation of the forestry industry. Regulation of an industry by government is justified when market prices fail to reflect the costs and benefits to society as a whole of activities undertaken by individuals and firms. The existence of a difference between the costs and benefits perceived by individuals and those faced by society is called "market failure."

Market failure in forestry can be linked to the existence of a variety of nonmarket (or "nontimber") benefits emanating from the forest base. These benefits include wildlife habitat, aesthetic or wilderness values, the prevention of soil erosion, and a contribution to water flow. In an unregulated environment, nontimber values would not influence the market evaluation of the forest base or the timing of the harvesting. Consequently, the market price of standing timber would underestimate its social marginal value, and current timber consumption would be too high relative to the socially desirable level.

A second source of market failure is associated with the belief that market discount rates are not appropriate for evaluating investments in forestry. Since investments in the forest base take at least 50 years to yield returns, even modest deviations from the correct discount rate could have a significant effect on the level of investment. The choice of the appropriate social discount rate, however, remains a contentious issue in economics. While a survey of the debate is beyond the scope of this discussion, the essential point is that an argument can be made that the social discount rate could be less than the observed market discount rate.

A third source of market failure relates to the potential social costs that can arise from the instability of lumber prices and forest production. Instability in itself does not produce a case for government intervention. However, if the resulting fluctuations in employment and earnings impose high social and psychic costs that are not reflected in market wages, such intervention may be justified. Thus the goal of community stability is often used as a justification for forest management policies based on the sustained-yield principle.

These potential sources of market failure may exist in forestry and thus may provide a rationale for government intervention. Unfortunately, government regulation as practised in British Columbia and the Prairie provinces does little to address the causes of market failure.

The Current Policy

The forest base in British Columbia differs significantly from the forester's ideal "normal" forest (see Appendix B). Much of the forest base in the province consists of natural timber whose age is in excess of 120 years: 55 per cent of the total productive forest land is classified as mature and 40 per cent as immature. The remainder consists of areas that were not satisfactorily restocked after harvesting, as well as noncommercial brush and areas otherwise unsuitable for commercial use. A normal forest would have a far smaller proportion of land containing timber that is ready to cut. There are also significant differences in the maturity of the forest base, the distribution of site quality, and the shape of the volume/age relationship between the Ministry of Forests' administrative regions ("timber management units"). All of these factors make it difficult to manage the forest base so as to achieve an objective that the B.C. Forest Service considers central – an even flow of timber from the forest base.

Rightly or wrongly, the B.C. Forest Service is concerned that it will not be possible to maintain commitment levels for the allowable annual cut permanently unless productivity-improving developments occur in forest management. Simulations performed by the Forest Service indicate that the volume of wood that the Crown had contracted to supply in 1977 from lands under its control could not be maintained. This falldown in harvest rates is caused by the decline in timber volume that accompanies the shift to second-growth timber and by the conversion of parts of the forest base to nontimber use or to "not satisfactorily restocked" status. Much

of the land being converted is at the bottom of highly productive valleys. Consequently, the impact on timber supply and forest revenues is proportionately greater than the decline in the exploitable forest base.

There are considerable differences within and between regions in British Columbia with respect to the number of years likely to elapse before the yield drops to the ultimate maximum sustainable yield – that is, in the timing of the falldown (Table 5-7). In addition, some timber supply areas within the larger regional units will experience falldown far sooner than is indicated by the figures for the whole region. For example, individual timber supply areas in the Nelson and Bulkley-Northwest regions could experience falldowns within five years. Under current management practices and the resulting productivity levels, and assuming that 1977 commitment levels are harvested, the provincial timber supply would be approximately two-thirds of the 1977 level once the mature timber was depleted.

Table 5-7

Wood-Supply Projections for British Columbia, by Region, and Variations between the Timber Supply Areas within Those Regions

	Number of years from 1980 until falldown begins	
	In the region	In individual timber supply areas
Bulkley-Northwest	40	5 - 60+
Cariboo	100+	10 - 100+
Kamloops	30	10 - 40+
Nelson	70	5 - 70+
Peace River	100+	20 - 100+
Prince George	60	15 - 100+
Prince Rupert	80	10 - 80+
Vancouver	50	10 - 60+

SOURCE British Columbia, Ministry of Forests, *Forest and Range Resource Analysis: Technical Report* (1980), vol. 2, p. 783.

Two distinct issues are at stake when discussing the regulatory role of government in the forestry industry. First, how should the existing inventory of mature timber be managed? Second, once the land is replanted, at what age should the second-growth timber be cut? The answers to these questions will play a critical role in determining timber supplies, in British Columbia and elsewhere. Present forest management policies lead to too slow a depletion of mature timber stocks and too long a rotation period for second-growth stands. The net effect is that supplies over the next 20 years or so will be sharply and unwisely restricted, while supplies beyond that period will be unwisely expanded. We shall be arguing that policy changes should be made to avoid this. However, it should be noted, for those concerned about the possible wisdom of such changes that they are not irrevocable. Since timber is a renewable resource, any decisions to harvest mature timber stands more rapidly and to shorten the rotation periods for second-growth timber would be reversible if experience revealed them as unwise.

Sustained-yield policies and the choice of the rotation period (or harvesting age) for timber obviously play a central role in forest management. The choice of the rotation age – that is, the age at which second-growth trees in a particular timber supply area should be harvested – is of fundamental importance in determining the volume of timber produced over a given period and its economic value to the owners of the forest base. It has given rise to considerable debate over the use of economic versus physical criteria. Provincial governments in the West and elsewhere use a physical criterion to set the rotation age; that is, they determine that a timber stand should be harvested when the average increment to the volume of the stand over its life is equal to the annual increment in a particular year. The choice of this rotation period ensures that the maximum volume of timber is obtained from a given site over time. The aim of the regulation in setting harvest levels is the achievement of a sustained yield of timber from the forest base. Under such a policy, additions to the volume of timber through growth are just offset by continuous harvesting. The adoption of a rotation period consistent with maximizing the volume of timber from a particular site will, in a sustained-yield framework, provide the maximum flow of timber from the forest base.

This rotation pattern for second-growth timber is costly to society, however, because it fails to take account of timber prices, discount rates, or harvesting costs. Economic criteria involve a rotation age that maximizes the value of the forest base to society. This value can be measured by either the "present net worth of stumpage" or the "soil expectation value." The results produced by either of these approaches could be different from those which are produced by physical criteria.[14]

Timber supply management policy in British Columbia presently uses physical criteria and, in principle, aims for a transition based on a steady approach to the ultimate maximum sustainable annual yield. It does not, however, adhere to this rigidly, and it is relatively flexible with respect to setting allowable annual cuts during the period when

the stock of mature timber is being depleted. There has been a marked shift away from strict reliance on mechanical formulas. The Ministry of Forests Act specifically requires that the Forest Service provide a range of alternative management options and an assessment of each option for longer-term timber supplies. The B.C. Forest Service will not, however, adopt short-term harvest rates that could cause the future wood supply to fall below the maximum sustainable yield in a given forest management unit (in Appendix Chart B-3, it would not follow harvest path A).

Rotation periods that maximize physical criteria are longer than those which maximize financial criteria, because they ignore the cost of capital. The capital whose carrying costs are implicitly being ignored is locked up in the standing timber. A government agency, unlike a private business, has no pecuniary incentive to allow for this cost. The cost to society of physical rotations is the income forgone on the value of the current harvestable timber stock and the loss of income from subsequent harvests that have been postponed. Both costs are high and should be taken into account when setting the timing of harvests. They are ignored by the criteria used at the moment.

The emphasis that some forest managers place on physical rather than economic criteria to manage the forest can arise from several factors other than the absence of pecuniary incentives. One likely factor is that trees are viewed as an end in themselves rather than as a resource to be used to improve society's well-being as much as possible. It is also possible that some forest managers are simply unaware of the income loss that results from maintaining too large a stock of mature timber and too long a rotation period for second-growth timber. This possibility is less likely, however, because the respective merits of physical and economic criteria have long been debated. Finally, it is also possible that the choice of physical criteria is made on the grounds that they make it easier to manage the forest. Timber volume/age relationships are easy to derive, whereas predictions about the state of economic variables three or four decades hence are often suspect. The problem with this argument is that it ignores the cost of adopting physical criteria (that is, the capital costs), which has to be compared with the value of greater certainty in prediction.

In fact, physical rotation periods cannot be justified as a means of correcting for market failure. Rotation periods that satisfy physical criteria ignore *all* financial variables, including the value of the nontimber benefits of the forest base. It has been found that rotations maximizing the soil expectation values of timber and nontimber benefits were not significantly different from timber-only rotations for a range of plausible values of nontimber benefits and discount rates.[15] The nontimber benefits were found to constitute a significant share of the joint soil expectation value. These results suggest that the multiple-use aspects of the forest base cannot be used as a justification for the adoption of the longer rotation periods that are associated with physical criteria.

The costs associated with the longer physical rotation periods can be substantial. Some authors have found that, in the case of all Douglas fir in British Columbia, the annual cost of basing the rotation period on maximization of the mean annual increment rather than on the present net worth amounted to $35 million.[16] This sum exceeded the total sum of direct revenues collected annually by the B.C. Forest Service. Other studies have focused on the sensitivity of the value of a "typical" Douglas fir stand to various rotation periods. The results suggest that a significant cost results from adopting rotation periods based on physical rather than economic criteria.[17]

These studies reveal that both physical and financial rotation periods are sensitive to factors such as site quality and the corresponding timber volume/age relationship of the species.[18] There is an added sensitivity to financial rotations, however, in that they also vary with changes in discount rates, stumpage values, and replanting costs. This added sensitivity is perhaps one reason why physical rotation periods are preferred to financial ones by any forest service: once the timber volume/age relationship is known, it is easy to derive the physical rotation period that will yield the maximum mean annual increments to timber growth. Yet the volatility of financial rotation periods need not be greater than that of physical ones. One would not recalculate the appropriate financial rotation period with every change in financial variables such as discount rates, stumpage values, and replanting costs. Since the harvest cycle extends over many years, one would expect that the anticipated trend values for these financial variables would enter into the calculation of the rotation period that maximizes soil expectation value or present net worth. In any case, the greater complexity of the calculation of financial rotations is no defence in favour of physical rotations if the latter generate significant costs.

Another very large cost results from the current use of noneconomic criteria. This cost, which arises from the desire to achieve a smooth transition to the falldown, is generated only in the case of a "nonideal" forest like the present B.C. forest. Much of the resource base in British Columbia is mature timber that is well past the economic, or even physical, rotation age. That mature timber represents

locked-up capital that is currently yielding nothing and very often actually depreciating. The income forgone from not cutting this timber is very substantial indeed.

The magnitude of the mature timber stock relative to committed and billed harvest levels in 1977 in British Columbia is quite surprising (Table 5-8). In four of the province's eight timber management units, the committed allowable annual cut constituted less than 1 per cent of the volume of mature timber. This calculation ignores immature stands that are reaching harvesting age and thus overestimates the importance of the committed cut relative to the forest base. Even if the volume of mature timber were reduced by half to take into account stands that are not economically accessible or that are composed of species that are not profitable to harvest, the committed cut would still constitute less than 2 per cent of the total stock of mature timber in four of the units.

Moreover, a sizable portion of the forest base consists of areas containing decadent or stagnant timber stands that are well past any reasonable rotation period and that, in many cases, occupy potentially very productive forest lands. The failure to harvest the current timber stock means that income is forgone on the existing stands as well as on subsequent stands from the sites.

It should be emphasized that the harvesting of mature timber is also good for the forest; indeed, proper conservation requires it, as decadent and stagnant stands are particularly susceptible to blowdown, rot, and disease. However, the cost of harvesting many such stands exceeds the current value of timber. Their harvesting should be considered a salvage operation, to be undertaken if the benefits of future harvests from the sites are likely to exceed the costs of harvesting and disposal.

How much income loss occurs because the current stock of mature timber is not harvested? A very crude estimate was obtained by assessing the value of mature timber at the minimum stumpage price for each species (excluding cedar) in 1977 in each of the timber management regions. The value of $16.3 billion arrived at by this calculation is obviously an overestimate, as much of the timber may not be economically accessible or it may be worth less than the average for a particular species. Moreover, the existing industry would not have the capability to harvest, transport, and process this volume of timber without a significant increase in investment. Yet, even if the total value of the stock of mature timber in 1977 were reduced by two-thirds, the adjusted sum of $5.4 billion would still yield an income stream of $522 million annually if it were invested at the prevailing corporate bond rate in 1977. Compare this with the total amount of stumpage fees and royalties actually paid in 1977 – $82.3 million. Thus the income forgone by rationing the stock of mature timber in a sustained-yield framework may be large, both absolutely and relative to the existing direct flow of income from the resource base. This suggests that the main

Table 5-8

Volume of Mature Timber and Committed and Billed Harvest Levels in British Columbia, by Region, 1977

	Volume of mature timber	Committed annual allowable cut	Billed cut	Total area of productive forest land	Decadent or stagant stands
	(Millions of cubic metres)	(Per cent)		(Thousands of hectares)	(Per cent)
Peace River	417.7	0.6	0.5	8,672.9	1.2
Prince George	1,269.7	0.9	0.8	8,623.9	7.5
Bulkley Northwest	1,186.9	0.4	0.3	8,329.4	15.4
Nelson	340.1	1.7	1.5	3,763.7	5.2
Kamloops	526.5	1.4	1.7	4,387.7	37.6
Vancouver	930.8	2.0	2.1	3,824.7	29.4
Cariboo	593.5	1.0	1.0	6,476.1	47.4
Prince Rupert	1,280.5	0.6	0.4	3,335.1	41.9
Total	6,545.7	..	..	47,413.5	20.6

SOURCE British Columbia, Ministry of Forests, *Forest Range Resource Analysis Technical Report* (1980); and *Forest and Range Resource Analysis and Five-Year Program Summary* (1980).

fault may have been in not cutting the timber rapidly enough rather than too rapidly. Too large an inventory of timber has been maintained relative to the needs of society. The issue was stated most succinctly by Hartley Lewis when he wrote:

> How much capital should be left in forests (as standing timber) depends on the returns available in this form compared with others. A desire to leave bequests to future generations of British Columbians does not require that these bequests be in trees. They could as well be in better homes or highways, in debt-free hydro dams or embodied in the future generations themselves in better health or education.[19]

The cost to society of employing physical criteria to set harvesting ages and of maintaining too large an inventory of mature timber is the forgone return on the income that would have resulted from a more rapid liquidation of the capital tied up in that timber. Since the returns from such liquidation would have accrued to the government in the form of stumpage payments and other revenues, the burden is actually borne by the taxpayers of British Columbia.

Obviously, if the rate of harvesting of mature stands were increased, the possibility of timber falldown would emerge in the future because of gaps in the age distribution of sites. The existence of such gaps is not, however, sufficient reason to reject that solution out of hand. The stream of income generated by the more rapid harvesting of mature timber stands must first be compared with the costs that would arise from timber falldown in the future.

Alternative Solutions

In view of the size of the forestry industry, the magnitude of mature timber stocks, and the emphasis in the Forest Act on managing the forest base for the maximum benefit of B.C. residents, the casual acceptance of the very costly current policies and the use of similarly costly physical rather than economic criteria for managing second-growth timber are surprising.

A very important determinant of the volume and value of the provincial timber supply, historically, is the expansion of the forestry industry into new geographic areas. The limit to the geographic area of economically accessible timber is called the "extensive margin." When the prices of forest products rise or when technological change in the harvesting, processing, and transportation of timber or forest products occurs, new forest areas are viewed as being profitable, and the extensive margin shifts outward.

In British Columbia, forests remain in the north and in the more mountainous parts of the south that, under a regime of higher prices or improved productivity, could become economically accessible. Similarly, in Alberta large forest areas east of the Rockies will eventually lie within the extensive margin should present trends continue. Market prices have been, and should continue to be, the main determinant of how quickly, and by how much, the timber supply can be augmented in this way. It is not clear, however, how much this factor can be relied upon in the future for significant additions to the timber supply. A recent estimate places the potential increase in the national timber supply from shifts in the extensive margin at less than 10 per cent.[20]

The limits to the expansion of economically accessible timber supplies imposed by soil, terrain, and climate have led to greater emphasis on methods to increase the productivity of the forest base within the extensive margin – another important determinant of timber supply. The basic options open to society to increase the volume of timber per hectare are: improved levels of protection against pests and forest fires; increased utilization standards; and intensive forest management practices (or investments in the forest base to improve productivity). All of these options involve a variety of costs to society. The problem facing government in its role as regulator and proprietor of the forest base is how to choose the option (or options) that is socially desirable – that is, for which the long-run benefits to society exceed the costs.

Of the three options, intensive forest management (or silviculture) has received the greatest attention and provides perhaps the greatest opportunity for an increase in timber supplies.[21] Estimates indicate that the sustainable timber supply in Canada could be increased by 55 million cubic metres by the mid-1990s, with intensive forest management practices accounting for 30 million cubic metres, and improved protection and better utilization standards for 15 and 10 million cubic metres, respectively.[22]

Intensive forest management includes a variety of treatments aimed at improving the productivity of the forest base, beyond the basic silvicultural practices already in place. It includes forest protection; research aimed at producing genetically superior trees, and increased nursery production of seedlings for such trees; backlog reforestation of previously harvested areas where natural regeneration has failed; and a variety of stand-tending techniques applied primarily to second-growth stands, including juvenile spacing (or precommercial thinning), commercial thinning, conifer release, and fertilization.

Estimates of the impact of intensive forest management on the physical productivity of the forest base

vary widely. However, an assessment of the investment in intensive forest management should go beyond physical criteria. Some intensive forest management practices are expensive, particularly backlog reforestation or juvenile spacing; and the returns to investments in these practices lie decades ahead. The question is whether such investments represent the most efficient allocation of society's scarce resources. The appropriate criterion for assessing their desirability is economic. Do such investments increase the present value of the managed stand relative to the untreated stand over one harvest cycle?

The evidence regarding the financial viability of intensive forest management initially appears mixed and difficult to evaluate. Some authors have suggested that reforestation with well-spaced, genetically improved seeds, along with juvenile spacing and fertilization, is not financially viable, even at a 5 per cent real interest rate.[23] The net present values of the investments were found to be negative. However, studies undertaken by firms in the forestry industry, especially those harvesting from Crown lands under "tree farm" licences or other area-based licences, suggest a very high return to investment in intensive forest management. Their calculations, however, often include the "allowable cut effect." This effect occurs when firms are allowed to increase current harvests of mature timber in anticipation of higher yields from the treated stands in the future. The present value of the investment includes not only the increase in the value of future timber yields discounted to the present, but also the value of the mature timber that they are able to harvest in the current period. The allowable-cut effect creates perverse incentives for firms to treat lands that are not really suitable for silviculture simply to increase current permitted harvests of mature timber. The present value of the investment could be negative when the allowable-cut effect is excluded but become positive and large when it is included.

One study examined the impact of intensive forest management on Douglas fir sites of varying characteristics in the coastal zone of British Columbia.[24] The author, using a sophisticated simulation process to examine the impact of various treatments on second-growth Douglas fir yields, found that juvenile spacing, commercial thinning, and fertilization on good sites meet financial criteria. The results were also subjected to a sensitivity analysis. Even at a real interest rate of 10 per cent, those investments on good sites were found to be profitable. A decline in wood prices from base period (1978-80) values would reduce the returns to intensive forestry, though they would still exceed those of the corresponding no-treatment case. More adverse site conditions would significantly reduce the payoff to intensive forestry. In some cases, however, careful intensive forest-management techniques could still yield higher values.

Weighing all the evidence, it seems that a significant increase in intensive forest management would be worthwhile. When selectively employed, it would yield significant gains to real incomes, arising from the increase in the quantity and quality of wood produced, often over a shorter time period, as well as from the fact that harvesting costs are often lower for treated stands because the timber is more uniform in size and generally larger.

A major issue concerning intensive forest management is the distribution of the costs and benefits of such investments. When the forest base is privately owned, there should be no need for activist government policy to increase intensive forest management, because firms already have adequate incentives in the private returns that accrue from their investments. The investing firms receive benefits in the form of the future higher value of the standing timber. In the United States, industrial timber firms appear to be active in investing in intensive forest management on land held on a fee-simple basis. However, a private evaluation of economic benefits would still exclude the value of nontimber benefits – that is, it would result in market failure.

When the forest base is government-owned, private forestry firms occupy a very different position, similar to that of a tenant who "rents" the services of the forest base. When the Crown correctly appraises the value of standing timber, the estimated stumpage represents the maximum rent that it can collect for the use of the forest base. Under these circumstances, private investment aimed at increasing the productivity of the forest base will lead to an increase in the value of stumpage, but this gain accrues to the Crown rather than to the firm undertaking the investment. As a result, investments that would be desirable on both social and private grounds would not be undertaken. There is, however, a solution to the problem.

The approach we recommend is a mixed private/public responsibility for evaluating, funding, and undertaking investments in the forest base. As owner of the resource base, government would screen the proposed projects and bear full responsibility for those which are judged desirable. Only those projects which satisfied financial criteria and whose calculation included *all* social costs and benefits would be approved and funded. Private firms would be responsible for the actual undertaking of the projects, and all their expenses (including capital costs) would be fully reimbursed.

We emphasize that nontimber benefits and costs should play a role in the evaluation of forest management decisions, just as they should in harvesting decisions. For example, if environmentally sensitive sites had been mistakenly harvested (for example, if nontimber costs had been ignored) and if timber benefits alone did not justify reforestation expenditures, these sites could undergo treatment if nontimber benefits were perceived to be high enough. Government would not, when assessing and ranking the merits of a specific investment, include as a benefit the value of the allowable-cut effect, were it to be present, because its inclusion would lead to distortions in the choice of the sites that should undergo treatment. Nevertheless, because the allowable-cut effect does increase the total harvest, we would like to retain this effect on the total. In line with our view that mature timber should be harvested more rapidly when market conditions warrant, we would urge that allowable harvest levels be increased immediately for all forms of tenure – both volume- and area-based – when investments aimed at increasing the productivity of the forest base are made.

Among the western provinces, British Columbia comes closest to possessing the institutional framework described above. Its appraisal system attempts to capture the full value of standing timber for the Crown. The province reimburses firms for expenditures on approved silvicultural projects by allowing these costs to be applied against the current stumpage owing. In addition, government funds are available for direct payments to support silviculture, but the amount is small and subject to the vagaries of the budgetary process. The recent restraint program of the provincial government, for example, led to a drop in the funds allocated to basic and intensive silviculture contained in the Ministry of Forests' five-year forest and resource program.

Yet there are problems even with British Columbia's institutional framework. In some years, the value of stumpage may be too low to offset silvicultural expenditures fully. Consequently, firms have to bear the carrying costs of these expenditures until stumpage increases. Similarly, allocations from government budgets are subject to financial constraints. Both of these factors could result in a "stop-go" pattern in silvicultural investment. Large expenditures would occur when stumpage values and government revenues were high, but investments would fall in years of depressed economic activity and forest product prices. Some aspects of intensive forest management, such as the operation of nurseries for seedlings and the production of genetically superior seed stocks, cannot be operated on a "stop-go" basis. The start-up costs are too high, and the lead time is too long.

One way of ensuring a continuous flow of funds to silvicultural investments would be to create a fund whose expenditures would be earmarked exclusively for approved projects. The initial capital endowment could derive from a once-and-for-all contribution by the Crown, augmented through time by some share of government revenues from forestry. The latter funds could be viewed as retained earnings being ploughed back into the firm. The main purpose of the fund would be to ensure that decisions about longer-term productive investments are insulated from short-term cyclical factors.

The one ultimate mechanism for ensuring a stable economic environment for private long-term investment in the forest base would be to sell Crown lands to the private sector. This approach would clarify a number of concerns, such as the distribution of the costs and benefits associated with intensive forestry, allowable-cut effects, and security of tenure. Such a policy, however, would encounter considerable opposition and possibly create new problems. Four important considerations are cited here. First, many B.C. residents view the forest base as part of their heritage and at election time would look unfavourably on any government that sold off Crown lands, regardless of the merits of the case. Second, there would be tremendous uncertainty during the period of transfer, which would cause many firms to postpone their investment plans; the costs of the transition could thus be substantial as firms waited to see what new rules of the game would emerge. Third, unacceptably high levels of concentration in the ownership of the forest base and sawmilling sectors could result. Finally, the problem of correcting market failure would remain.

Presently, only 6 per cent of the forest base is privately owned. That share could increase with the settlement of aboriginal land claims, although some observers suggest that this could lead to withdrawals from the forest base. We are less concerned. There is no reason to believe that aboriginal owners behave any differently than other private owners in ensuring the most productive use of their assets – in this case, forest land.

The *de facto* embargo on the export of unprocessed logs from British Columbia is another aspect of the regulation of the industry that has a significant impact on real incomes and industrial structure in the province. The intent of this export restriction is to promote further processing of timber within British Columbia and to increase employment in the processing sectors of the provincial economy. The new

jobs resulting from the expansion of primary manufacturing activity are seen as a net gain to the economy, while the export of unprocessed logs is viewed as the export of jobs.

The expansion of primary manufacturing output and employment does not, however, represent a net gain to the province. The embargo may only shift activity between the coast and the interior of British Columbia and redistribute employment among sectors of the industry, with new jobs being created in the wood product and pulp and paper industries, and jobs being lost in logging. The impact on aggregate employment is more difficult to predict, but income per capita is lower than it would be in the absence of the embargo because the resource base is used less efficiently. Stumpage revenues received by the provincial government are also significantly lower because of the embargo. Consequently, the government's ability to reduce taxes or increase expenditures on social infrastructure – such as roads, schools, and hospitals – is reduced.

Ownership

In examining the role of government as owner of the forest, we focus on the institutional mechanisms protecting its financial interests. Is the government successful in capturing the return to the forest base (i.e., the economic rent), thus ensuring the proprietary rights of the residents of the province? Does it do so without distorting the pattern of production in the industry?

The Stumpage Mechanism

In British Columbia, 94 per cent of all forest land is owned by the provincial government. Harvest rights on the Crown lands are distributed among firms on the basis of a complicated set of tenure and quota regulations. The harvest is mostly subject to the payment of stumpage, the value of which is derived from the timber appraisal system.

To this end, the province calculates the value of standing timber as a residual, employing the Rothery method of timber appraisal.[25] In principle, the Rothery method should ensure that the resource owners capture all of the rent to which they are entitled, while allowing the capital and labour employed in the industry to receive a fair return. It should also result in an equitable appraisal system that takes into account differences in site productivity and in harvesting and processing costs, as well as species prices.

It is important to note that, in subtracting costs from prices, the B.C. Forest Service bases its calculations of average operating costs on the concept of the "average efficient operator" and derives estimates, by phase of operation, of logging and milling costs from annual surveys of representative firms in the industry. Thus the costs deducted from the end-product price for a particular stand are not those *actually* incurred by the firm in removing the timber (or the processing costs incurred by operators in the interior), but rather those which *would be* incurred by the average efficient operator.

The stumpage mechanism is designed to be flexible and to reflect the current value of the timber resource. The end-product price used in the stumpage formula varies with current market conditions. The data on stumpage prices clearly reveal the sensitivity of the appraisals to price movements and the differences in site productivity and species mix.

The producers of softwood lumber in the United States have claimed that B.C. stumpage rates are too low and that they constitute an implicit subsidy for the province's softwood producers, providing them with an unfair advantage in the U.S. lumber market. In a study conducted for the Economic Council, however, the author found that while a "leakage" of rents from the appraisal system is possible, the magnitude of the loss is not large relative to the value of rents in the forest industry.[26] Moreover, even if the system did not collect the full rents, that failure would not affect production and exports. Just as the skimming-off of rents does not reduce output or exports when it is done properly, so failure to skim them off fully will not increase output or exports.

Thus any failure of the Crown to collect resource rents represents a redistribution of income from the Crown (and consequently from taxpayers) to the private sector. But such a redistribution does not increase production levels. Thus the claim of the U.S. softwood producers is incorrect.

The Effects of the Current Appraisal System

There are, we believe, two problems with the current timber appraisal system in British Columbia. The first concerns the actual calculation of stumpage and its failure to link the profit allowance specifically to the capital stock employed in the industry. The second problem arises from the manner in which stumpage levies are imposed on firms.

The profit allowance used in the Rothery formula is based on a percentage of operating costs and stumpage values, and it can be shown to be nothing more than a share of the end-product price. The main problem is that this profit allowance is independent of the capital stock employed in the industry.[27] Only under very restrictive assumptions will this imputation generate signals for investment in the industry that will be equivalent to those resulting from a profit allowance based on an estimate of the actual capital

stock employed by an average efficient operator. There is the strong possibility that this procedure for setting a profit allowance could lead to less capital-intensive production than true social efficiency would require. This bias against capital investment could have serious implications for productivity in the industry, since it reduces the incentive to purchase the latest capital goods. It could lead the industry to delay the adoption of the innovations that are generally incorporated in the newest capital stock, and labour productivity (and hence wages) might not rise as rapidly as it could.

Because of how the profit allowance is calculated, the current appraisal procedures might also distort the process of wage bargaining. Specifically the industry may have a reduced incentive to bargain vigorously. The profit allowance under the Rothery formula is calculated in such a way that the profit of any firm is less affected by changes in industry-wide wages than if no formula were used, or if the formula linked profits to capital. However, the possible impact of this on raising wages should not be exaggerated. Other factors could well explain the industry's relatively high wages. Important in this regard are: the high productivity in the industry; the need to compensate for the riskiness of forestry occupations; and the highly seasonal nature of much forestry work.

The solution to these problems is to adopt the recommendation of the Timber Appraisal Task Force and to link the profit allowance to the capital costs that would be incurred by the average efficient operator.[28] The relevant capital stock should be valued at replacement cost, while the profit allowance should reflect an estimate of the before-tax real opportunity cost of capital to the industry. The object would be to ensure that the industry has the incentive to invest in new capital and new technologies when market conditions warrant.

There is also concern that the manner of imposing stumpage fees on firms could adversely affect productivity in the industry. Stumpage is currently levied in a two-step procedure. First, an appraisal of the value of the timber on site is made, providing a lump-sum value of the stand in terms of the quantity of timber and its stumpage value. At present, firms are not charged this lump-sum value. Instead, they are charged the average value of stumpage for the particular timber species on each cubic metre of timber harvested.

This procedure has disincentive effects for recovering lower-valued timber. The firm will not remove logs whose addition to revenues just cover the harvesting costs, as it is the average value per cubic metre that must be recovered. Under these circumstances, firms have a real incentive to favour high-grade stands by harvesting the more valuable species and leaving the less desirable species behind. The incentives introduced by levying stumpage as a per-unit charge rather than as a lump-sum value based on the timber appraisal on site may explain why the B.C. government is so heavily involved in enforcing utilization standards. There are strong incentives in the present system to remove less timber than predicted by the timber appraisal system.

We see considerable merit in the proposition that forestry firms be assessed the lump-sum appraised value of the timber on site. The payment of the appraised value could be made through time and prorated on the basis of the volume of timber removed. The initial appraised value could also be adjusted to incorporate changes in end-product prices and production costs, as is presently done in assessing stumpage.

Recommendations

The central thrust of our recommendations is that a combination of policy and institutional changes could ensure the long-run viability of the forestry industry and enhance its contribution to regional income. The policy change would involve switching from the present criteria used in managing the forest and setting the rate of harvesting, which stress the physical volume and temporal stability of output, to economic criteria. Let us emphasize immediately that regardless of which criteria are applied, full provision must be made for environmental protection. We would also like to stress that both types of criteria embody the requirement that the forestry be managed as a renewable resource rather than on a "cut and run" basis. Economic criteria, however, emphasize the realization of the maximum social value from the forest, whereas the physical criteria stress the volume and stability of output. A switch to economic criteria would have important consequences: the stock of mature timber would be harvested faster, though how much faster still needs analysis; and second-growth timber would be harvested – and replanting would occur – at more frequent intervals. As for the institutional change, it would involve the creation of more effective arrangements for investment in intensive forest management. We believe that this change would result in a much greater volume of such investment and a consequent increase in the rate of growth of productivity in the forestry industry.

The need for the change in policy – easily the more revolutionary one – should be viewed as a criticism of forestry management in general, not of forestry management as it is conducted in British Columbia. By accepted Canadian and world standards, B.C.

forest management is of high quality. Nor does such criticism originate with the Economic Council; it has been voiced for decades by forestry economists. At this point in B.C. history, however, the implementation of the economic criteria is crucial.

Present management criteria focus on achieving a maximum annual sustainable yield from the forest in the future, at the time when all growth will be second growth, and achieving as smooth as possible a transition to that yield, so as to avoid instability in the communities and industries dependent on the forestry. These goals are not without merit. Stability is particularly desirable, but we believe it can be achieved in a less costly way. Under the criterion used at present, the current stock of mature timber is an idle asset. At the same time, it is a valuable asset, worth billions of dollars. By leaving it unexploited, the province is forgoing millions of dollars in annual revenue, in the form of the potential yield on investments of the money value of the asset. It is also losing potential income from the value of future harvests that are being postponed. In addition, by using physical criteria with respect to second-growth stands, further income is being lost, because the increase in value from letting the timber grow is less than could be obtained by harvesting it and investing the proceeds.

There is little doubt that the switch to economic criteria would dramatically increase the forestry industry's contribution to income growth in British Columbia for several decades. Even if the policy change were not made, however, and if the present criteria remained dominant in harvesting policy, the suggested institutional change could make a dramatic difference.

Research strongly suggests that large, *properly directed* investments in intensive forest management would greatly increase harvest yields. Though the total investment would be substantial, it could be allocated to a large number of separate investments on particular sites, most of which could individually be quite small. The result of such investment would be that the volume and value of output could grow even if the area harvested were not permitted to increase or were cut back. Not enough investment occurs presently because the incentives and the distribution of costs and benefits are inappropriate. The companies currently responsible for such investment neither pay the costs for it nor obtain the return. They often do it for the socially inadequate – albeit privately rational – reason that it enables them to increase their allowable cut. This incentive may lead to too little investment, however, or to investment that is misdirected. By altering the institutional arrangements for such investment, the rate of growth of future forestry output could be significantly raised. One attractive possibility would be to place the responsibility for *funding* basic and intensive forest management squarely on the shoulders of the provincial government, with the latter earmarking an optimal level of funds for such investment, but to have the private sector undertake the actual *operations*. There would be beneficial effects on the whole B.C. economy.

Whether or not these changes are effected some productivity growth will certainly occur. Long-run price trends seem reasonably favourable, so that the future will not see zero growth even if present harvesting criteria are retained and even if investment in intensive forest management is not increased. But the two changes we propose would almost certainly guarantee that the contribution of forestry to B.C. economic growth would be significantly larger.

Regulation

Our first set of recommendations therefore concerns the regulation of the timber supply. Throughout, we wish the changes that we are suggesting to be implemented with continued, or improved, provision for environmental protection.

Because mature timber is an asset that we are currently not using to its full economic potential, one that is yielding a lower return than would obtain if the timber were harvested and the stumpage income invested, and one that is occupying some of the most productive timber sites in the province,

1 **We recommend that the stock of mature timber in British Columbia be harvested at a faster rate than present policies permit, as soon as (and whenever) market conditions make it profitable to do so, and that this be done with full provision for environmental protection.**

Harvesting should, of course, be followed by replanting of the sites, whenever socially worthwhile, using whatever basic and intensive forest management treatments yield the highest return to society. Moreover, the additional revenues gained by governments as a result of this policy should be used and invested as wisely as possible.

With respect to second-growth timber, we recall that physical criteria are presently being used to choose rotation periods – that is, to decide how frequently harvesting and the subsequent replanting should be done. Such criteria ignore the income forgone on the capital tied up in the growing timber, and the full economic value of the forest resource is not being realized for its collective owners. Consequently,

2 **We recommend that there be much greater emphasis on economic criteria and far less on physical criteria when choosing rotation periods**

for second-growth timber, provided that this can be done with full provision for the protection of the environment.

Intensive Forest Management

Our next recommendations emphasize the importance of intensive forest management as a means of obtaining higher real income from the forest base and ensuring that the West remains competitive in world markets. First, there is a need to revise the procedures for evaluating whether investments in intensive management are worthwhile. Accordingly,

3 **We recommend that all intensive forest management practices for which the present value is positive be undertaken and that those investments with the highest ratio of benefits to costs be undertaken first.**

The allowable-cut effect should not be included as a benefit when the present value of the investment is calculated.

A long waiting period occurs before investments in intensive forest management show positive returns. Both government and private firms can be myopic or they can be prevented by short-run considerations from undertaking investments in forestry that are highly profitable from society's perspective. Thus it becomes especially important that the second part of our recommendation apply – that those investments with the highest ratio of benefits to costs be undertaken first. But, to avoid problems, it would be as well that earmarked funds be available. Moreover, investments in basic and intensive forest management should be viewed by government as investments in capital stock rather than treated as current expenditures. Therefore,

4 **We recommend that the government of British Columbia, through a savings fund similar to the Heritage Funds of Alberta and Saskatchewan, earmark monies for investment in forestry.**

An important question is who should pay for the investments. As far as Crown lands are concerned, if the provincial governments succeed, through good timber appraisal policies, in capturing the full value of resource revenues due them as owners of the forest base, the benefits of all investments will accrue to the Crown in the form of higher stumpage. It is only reasonable, then, that the Crown should incur the costs. Accordingly,

5 **We recommend that the Crown bear all costs related to basic and intensive forest management on Crown lands.**

Finally, although the government should fund fully those investments which are socially desirable, actual forestry activity should be undertaken by the private sector. Consequently,

6 **We recommend that the actual mechanics of undertaking investments in basic and intensive forest management involve a mix of public and private sector participation.**

The government should permit the resultant costs incurred by the private sector to be offset fully against dues, royalties, and stumpage charges due the Crown. If the latter charges are exceeded, direct payments should be made to private firms from the earmarked fund suggested above.

Logging Regulations and Stumpage

Since the imposition of restrictions on logging activity or the removal of land from the forest base entails costs, greater effort should be made to analyse such policies and land removals, using the traditional tools of cost/benefit analysis. Therefore,

7 **We recommend that provincial governments consider the economic impact of restrictions on logging and of further reductions in the forest base, particularly when they affect good and medium-quality timber sites. The costs of environmental restrictions and of the additional removal of productive land from the forest base should be compared with the stream of anticipated benefits.**

Timber appraisal policies could be more economically efficient while still maintaining the proprietary role of the Crown. The present appraisal system generates a disincentive to capital use. To remove this,

8 **We recommend that when the Rothery system is employed to calculate the values of stumpage, the profit allowances be linked explicitly to the before-tax opportunity cost of the capital stock that would be used by the average efficient forestry operator.**

Implementing this recommendation should bring about the more rapid adoption of machinery and other capital goods that embody the latest and most efficient technology available to the industry.

In order to remove the output-reducing effect of the present system,

9 **We recommend that stumpage payments be a lump sum based on the appraisal value of the timber on site.**

The payment of this lump sum could be prorated according to the volume of timber removed through time, and it could also incorporate a provision for fluctuations in end-product prices and production costs.

Marketing

Our final recommendations concern the marketing of B.C. exports of forest products. The restrictions on

unprocessed log exports serve primarily to redistribute economic activity from the forestry industry to the wood products and paper and allied products industries. The costs of this are a lower level of employment and production in forestry and a lower value of resource revenues accruing to the Crown. The latter cost is effectively borne by all residents in their collective role as owners of the resource base. To eliminate these costs,

10 We recommend that provincial restrictions on the export of unprocessed logs be gradually relaxed.

Transportation costs – rail and ocean eight rates – constitute a significant proportion of the delivered price of forest product exports. There is concern in the West that Canada may one day consider adopting a national shipping line, to the detriment of these exports. Similar concerns have been voiced about the setting of rail freight rates and the risk that bottlenecks in the rail system might not be eliminated as rapidly as is socially efficient. As the federal government has powers and responsibilities in all these areas,

11 We recommend that the federal government ensure that the western forestry industry will continue to have access to the lowest-cost ocean transportation available; that rail freight rates will not discriminate against forest products; and that bottlenecks in the rail system will not hamper the industry's access to Canadian or U.S. markets.

Our basic concern in this chapter has been the ability of the forest industry to maintain, or further contribute to, economic growth in the West, especially British Columbia. We first considered whether fears about the longer-term viability of the forest industry were justified and, if so, what could be done. We then examined whether the current mix of regulatory and market forces that constrain economic activity in the forest industry enables it to contribute as much to regional income as it could or should through time. We are quite optimistic about the longer-term ability of the industry to contribute to regional income. Our optimism hinges, however, upon the implementation of our key recommendations.

6 Oil and Natural Gas

Just as the forests are the central resource in British Columbia, so are oil and gas in Alberta. The parallel is closer yet. The heyday of rapid growth in the oil and gas industry in Alberta is possibly over, just as it threatens to be for the forestry industry in British Columbia. Concomitantly, Alberta's overall economic growth will slow down, our estimates show, though the slower growth rate will be close to the Canadian average. An important difference from the case of the forestry in British Columbia is that there is much less scope for policy to check or reverse the slowdown in oil and gas production in Alberta. The changes that could be made are worthwhile, but none would make a dramatic difference. The slowdown affects Sas-

Table 6-1

Crude Oil Production in the Western Provinces, Canada, 1947-82

	Conventional oil					Synthetic and experimental oil
	Manitoba	Saskatchewan	Alberta	British Columbia	Western provinces	Alberta
	(Millions of cubic metres)					
1947	-	0.1	1.0	-	1.1	-
1948	-	0.1	1.7	-	1.8	-
1949	-	0.1	3.1	-	3.3	-
1950	-	0.2	4.3	-	4.5	-
1951	--	0.2	7.3	-	7.5	-
1952	--	0.3	9.3	-	9.6	-
1953	0.1	0.4	12.2	-	12.7	-
1954	0.3	0.9	13.9	-	15.1	-
1955	0.7	1.8	17.9	--	20.4	-
1956	0.9	3.3	22.8	--	27.1	-
1957	1.0	5.9	21.7	0.1	28.6	-
1958	0.9	7.1	17.9	0.1	26.0	-
1959	0.8	7.5	20.5	0.1	28.9	-
1960	0.8	8.2	20.8	0.1	29.9	-
1961	0.7	8.9	25.1	0.2	34.8	-
1962	0.6	10.2	26.2	1.4	38.5	-
1963	0.6	11.3	26.8	2.0	40.7	-
1964	0.7	12.9	27.9	1.8	43.3	-
1965	0.8	14.0	29.2	2.1	46.1	-
1966	0.8	14.8	32.2	2.6	50.5	-
1967	0.9	14.7	36.7	3.1	55.4	0.1
1968	1.0	14.6	40.0	3.5	59.1	0.9
1969	1.0	13.9	45.6	4.0	64.5	1.7
1970	0.9	14.2	52.4	4.0	71.6	1.9
1971	0.9	14.1	56.8	4.0	75.7	2.5
1972	0.8	13.8	67.5	3.8	85.9	3.0
1973	0.8	13.6	83.0	3.4	100.8	3.0
1974	0.8	11.7	79.1	3.0	94.6	2.7
1975	0.7	9.4	67.5	2.3	79.9	2.7
1976	0.6	8.9	60.9	2.4	72.8	3.2
1977	0.6	9.8	60.5	2.2	73.1	3.1
1978	0.6	9.6	60.0	2.0	72.2	3.7
1979	0.6	9.4	68.5	2.1	80.6	5.9
1980	0.6	9.3	63.2	2.0	75.1	8.0
1981	0.5	7.4	57.0	2.0	66.9	7.2
1982	0.6	8.1	54.4	2.1	65.1	8.2

SOURCE Based on data from Canadian Petroleum Association, *Statistical Handbook*, various years.

katchewan and British Columbia also but is of much less significance there, given the much lower relative importance of oil and gas.

From our analysis of oil and gas resources our basic conclusion is that Alberta is close to a decisive point in its economic history. If a transition away from heavy dependence on natural resources is to come about, it must be achieved soon – probably during the next decade or two. The evidence in this report suggests that the transition is probably achievable; the analysis in this chapter confirms the need for it.

The oil and gas industry in Alberta is only a part, though a big part, of the energy industry in Canada. The Economic Council of Canada is currently engaged in a major research project on the economic aspects of energy problems. The results of that project will become available later in 1984. In some respects, therefore, this chapter provides only a glimpse of what is to come. We do not deal here with all aspects of energy, deferring them to the forthcoming "energy" report. Nor do we examine in detail the question of the distribution of the surplus value of oil and gas above full production costs – what economists call "economic rents" – among producers, consumers, and the various levels of government. Essentially, we restrict our attention to how oil and gas production affects the economic growth of the western provinces without discussing the sharing of rents, even though we recognize that the size, distribution, and method of collecting rents influence the volume of oil and gas production.

Table 6-2

Natural Gas Production in the Western Provinces, Canada, 1947-82

	Saskatchewan	Alberta	British Columbia	Western provinces	Total exports from Canada
			(Billions of cubic metres)		
1947	--	1.4	-	1.4	-
1948	--	1.6	-	1.6	-
1949	--	1.8	-	1.8	-
1950	--	2.0	-	2.1	-
1951	--	2.2	-	2.3	-
1952	--	2.6	-	2.6	0.2
1953	--	3.1	-	3.1	0.3
1954	0.1	3.6	--	3.8	0.2
1955	0.3	4.5	--	4.8	0.3
1956	0.6	5.3	--	5.9	0.3
1957	0.9	6.3	0.2	7.5	0.4
1958	1.2	7.6	1.8	10.6	2.5
1959	1.5	9.3	1.9	12.8	2.4
1960	1.5	11.6	2.4	15.5	2.6
1961	1.6	15.1	2.9	19.7	4.8
1962	1.7	22.1	3.6	27.4	9.1
1963	1.7	24.5	3.8	30.0	9.7
1964	1.8	28.0	4.1	33.9	11.4
1965	1.7	30.5	4.8	37.0	11.4
1966	1.9	32.3	5.6	39.8	12.1
1967	1.8	35.4	6.7	43.9	14.3
1968	1.9	40.4	7.7	50.0	16.9
1969	2.0	47.3	8.9	58.2	19.0
1970	2.3	54.4	9.6	66.3	21.8
1971	2.5	59.6	10.0	72.0	25.6
1972	2.2	68.0	12.4	82.6	28.5
1973	2.2	73.6	13.5	89.2	29.2
1974	2.0	73.4	11.6	87.0	27.2
1975	2.0	74.5	11.3	87.7	26.9
1976	1.9	75.2	10.8	88.0	27.0
1977	1.7	78.5	11.1	91.3	28.2
1978	1.6	77.5	10.0	89.0	25.0
1979	1.6	82.3	11.4	95.3	27.9
1980	1.6	77.4	9.0	87.9	22.8
1981	1.5	76.4	8.4	86.3	21.6
1982	1.6	78.5	7.9	88.0	22.1

SOURCE Based on data from Canadian Petroleum Association, *Statistical Handbook*, various years.

At this point in our energy study we cannot make categorical recommendations on rent sharing for the oil and gas sector. Our research indicates, however, that government revenues derived from resources should be based on profits rather than on the industry's revenues. Such a system would avoid the production-restraining effect of the present Petroleum and Gas Revenue Tax (PGRT). If our preliminary findings hold up when all the research is in, we shall make an appropriate recommendation on this subject then.

Currently almost all Canadian oil and gas production is concentrated in the western provinces, and 84 per cent of the total is produced in Alberta. Obviously, the oil and gas industry has a much bigger effect on the economy in Alberta than in the other western provinces. Thus we focus our discussion on Alberta, though not to the total exclusion of Saskatchewan and British Columbia.

The Industry in Alberta, 1961-83

The influence of the oil and gas industry on the growth of Alberta's economy has been very substantial. Between 1961 and 1973 the province's oil production increased more than threefold and its natural gas production almost fivefold (Tables 6-1 and 6-2). During this period the wellhead prices of oil

Table 6-3

Wellhead Price of Crude Oil and Natural Gas, Western Canada, 1947-82

	Wellhead price			Price in 1981 dollars	
	Crude oil per cubic metre	Natural gas per 1,000 cubic metres	Consumer price index	Crude oil per cubic metre	Natural gas per 1,000 cubic metres
	(Dollars)		(1981 = 100.0)	(Dollars)	
1947	16.00	2.40	20.8	76.92	11.54
1948	18.91	2.32	23.7	79.79	9.79
1949	17.75	2.24	24.5	72.45	9.14
1950	18.15	2.08	25.2	72.02	8.25
1951	15.62	2.19	27.9	55.99	7.85
1952	14.67	3.33	28.6	51.29	11.64
1953	15.50	3.30	28.3	54.77	11.66
1954	15.91	3.28	28.5	55.82	11.51
1955	14.78	3.32	28.5	51.86	11.65
1956	14.88	3.41	28.9	51.49	11.80
1957	15.77	3.54	29.9	52.74	11.84
1958	15.25	3.38	30.7	49.67	11.01
1959	14.57	3.18	31.0	47.00	10.26
1960	14.43	3.42	31.4	45.96	10.89
1961	14.31	4.06	31.7	45.14	12.81
1962	13.98	4.31	32.1	43.55	13.43
1963	14.90	4.73	32.6	45.71	14.51
1964	15.34	4.92	33.2	46.20	14.82
1965	15.38	4.87	34.0	45.24	14.32
1966	15.42	5.08	35.3	43.68	14.39
1967	15.40	5.12	36.5	42.19	14.03
1968	15.43	5.10	38.0	40.61	13.42
1969	15.15	5.03	39.7	38.16	12.67
1970	15.56	5.26	41.0	37.95	12.83
1971	17.22	5.22	42.2	40.81	12.37
1972	17.36	5.43	44.3	39.19	12.26
1973	21.44	5.99	47.6	45.04	12.58
1974	35.87	9.49	52.8	67.94	17.97
1975	45.09	19.26	58.5	77.08	32.92
1976	52.57	31.31	62.9	83.58	49.76
1977	63.22	41.70	67.9	93.11	61.41
1978	75.70	49.31	74.0	102.30	66.64
1979	81.95	56.06	80.7	101.55	69.47
1980	97.00	77.13	88.9	109.11	86.76
1981	117.10	82.35	100.0	117.10	82.35
1982	154.35	89.78	110.8	139.31	81.03

SOURCE Based on data from Canadian Petroleum Association, *Statistical Handbook*, various years.

Table 6-4

Gross Domestic Product per Capita in the Western Provinces, Canada, 1961-82

	Gross domestic product					Population					Gross domestic product per capita				
	Manitoba	Saskat-chewan	Alberta	British Columbia	Canada	Manitoba	Saskat-chewan	Alberta	British Columbia	Canada	Manitoba	Saskat-chewan	Alberta	British Columbia	Canada
	(Millions of 1971$)					(Thousands)					(1971$)				
1961	2,189	1,962	4,030	4,701	47,909	922	925	1,332	1,629	18,238	2,374	2,121	3,026	2,886	2,627
1962	2,393	2,334	4,229	5,059	51,275	936	930	1,369	1,660	18,583	2,557	2,510	3,089	3,048	2,759
1963	2,486	2,546	4,449	5,331	54,079	949	933	1,403	1,699	18,931	2,620	2,838	3,171	3,138	2,857
1964	2,588	2,483	4,716	5,773	57,805	959	942	1,429	1,745	19,290	2,699	2,636	3,300	3,308	2,997
1965	2,687	2,713	5,040	6,359	61,986	965	950	1,450	1,797	19,644	2,784	2,856	3,476	3,539	3,155
1966	2,821	3,017	5,400	6,894	66,203	963	955	1,463	1,874	20,015	2,929	3,159	3,691	3,679	3,308
1967	2,915	2,769	5,759	7,272	68,551	963	957	1,490	1,945	20,378	3,027	2,893	3,865	3,739	3,364
1968	3,095	2,863	6,170	7,629	72,337	971	960	1,524	2,003	20,701	3,187	2,982	4,049	3,809	3,494
1969	3,292	3,037	6,707	8,268	76,829	979	958	1,559	2,060	21,001	3,363	3,170	4,302	4,014	3,658
1970	3,331	2,851	6,957	8,379	78,542	983	941	1,595	2,128	21,297	3,389	3,030	4,362	3,938	3,688
1971	3,534	3,195	7,378	9,074	83,227	988	926	1,626	2,185	21,568	3,577	3,450	4,532	4,153	3,859
1972	3,722	3,167	8,047	9,646	88,120	991	914	1,657	2,241	21,802	3,756	3,465	4,856	4,304	4,042
1973	3,972	3,351	8,690	10,660	95,028	996	905	1,690	2,302	22,043	3,988	3,703	5,142	4,631	4,311
1974	4,128	3,384	9,168	10,973	99,379	1,007	900	1,722	2,376	22,364	4,099	3,760	5,324	4,618	4,444
1975	4,146	3,620	9,722	10,960	100,257	1,014	907	1,778	2,433	22,697	4,089	3,991	5,468	4,505	4,417
1976	4,339	3,923	10,422	11,920	105,644	1,022	921	1,838	2,467	22,993	4,246	4,260	5,670	4,832	4,595
1977	4,408	3,962	10,984	12,406	108,556	1,027	935	1,913	2,500	23,273	4,292	4,237	5,742	4,962	4,664
1978	4,458	4,121	11,782	13,034	112,085	1,032	943	1,983	2,542	23,517	4,320	4,370	5,942	5,127	4,766
1979	4,477	4,038	12,951	13,623	116,573	1,028	951	2,053	2,589	23,747	4,355	4,246	6,308	5,262	4,909
1980	4,486	4,171	13,557	14,321	118,080	1,025	959	2,141	2,666	24,043	4,377	4,349	6,332	5,372	4,911
1981	4,676	4,311	14,514	14,828	121,536	1,026	968	2,237	2,744	24,342	4,558	4,454	6,488	5,404	4,993
1982	4,541	4,263	13,868	13,867	115,927	1,035	979	2,317	2,790	24,634	4,387	4,354	5,985	4,970	4,706

SOURCE Based on data from the Conference Board of Canada and from Statistics Canada.

and gas increased at approximately the same relatively slow rate as the consumer price index (Table 6-3). Increasing oil and gas output and the production of petrochemicals contributed considerably to the 6.6 per cent average growth rate of Alberta's economy, compared with 5.9 per cent for Canada as a whole (Table 6-4). The chemical industry, using natural gas feedstocks to produce petrochemicals, increased its output at a rate of 7.8 per cent and in 1973 employed 2,482 persons (Table 6-5). Real domestic product per capita, in 1971 dollars, grew from $3,026 in 1961 to $5,142 in 1973 – that is, by 4.5 per cent per annum, compared with the national average of 4.2 per cent.

In the period preceding the OPEC crisis in late 1973, oil and gas royalties and leases contributed between $250 million and $350 million annually to the provincial treasury (Table 6-6). In fiscal year 1972/73 oil and gas revenues accounted for more than a quarter of the provincial government's expenditures. This enabled Alberta to go without a provincial sales tax – the only Canadian province in such an enviable position.

Table 6-5

Value of Shipments of the Chemical and Chemical Products Industries, Alberta, 1961-81

	Value of shipments	Industry selling price index	Value of shipments in 1971 dollars
	($ Millions)	(1971 = 1.00)	($ Millions)
1961	61.3	0.975	62.9
1962	73.0	0.971	75.2
1963	81.1	0.969	83.7
1964	84.8	0.963	88.1
1965	91.3	0.961	95.0
1966	106.0	0.958	110.6
1967	114.9	0.976	117.7
1968	113.0	0.985	114.7
1969	110.8	0.986	112.4
1970	108.1	0.990	109.2
1971	124.4	1.000	124.4
1972	136.9	1.014	135.0
1973	164.1	1.065	154.1
1974	228.3	1.371	166.5
1975	280.7	1.603	175.1
1976	312.1	1.672	186.7
1977	416.6	1.758	237.0
1978	609.4	1.893	321.9
1979	755.2	2.149	351.4
1980	1,112.6	2.516	442.2
1981	1,472.4	2.864	514.1

SOURCE Based on data from Alberta Bureau of Statistics and from Statistics Canada.

The nature of the oil and gas industry enables it to provide much income and product but relatively little direct employment. The oil and gas industry's direct contribution to provincial employment has been modest. In 1973 employment in Alberta's oil and gas industry, as defined by Statistics Canada, stood at a mere 15,100 – 2.1 per cent of total provincial employment (Table 6-7). Even if we were to make a very generous allowance and include employment in industries incidental to mining (such as contract drilling), the employment related to oil and gas production would still have accounted for a mere 4.0 per cent of Alberta's total employed. Of course, the oil and gas industry has also had a very substantial indirect effect on employment through its supplier and customer industries, but our knowledge of the extent of that contribution is presently incomplete. Alberta's unemployment rate averaged 3.5 per cent during the 1961-73 period – well below the national average of 5.3 per cent (see Chart 2-2).

Alberta's population grew by about 29,800 persons annually, or at a rate of 2 per cent, from 1961 to 1973, while Canada's grew at a rate of 1.6 per cent. Alberta attracted an average annual net in-migration of 3,300 persons, mostly from the other Prairie provinces, with Saskatchewan predominating.

After 1973 the situation changed in many important respects. For the public the most conspicuous changes were the sudden, repeated, and substantial increases in world petroleum prices exacted by the Organization of Petroleum Exporting Countries (OPEC). Even though federal government price regulations moderated the Canadian wellhead price increases, the real (inflation-adjusted) price of crude oil increased more than two-and-a-half times between 1973 and 1981; that of natural gas, more than six-and-a-half times.

But nowhere near all of the wellhead price increases profited the producers. The complex royalty and tax regulations divided the additional profits among the producers and the federal and provincial governments. For example, an average oil pool discovered in 1981 would have earned $117.12 per cubic metre of oil that year, and royalties and taxes would have absorbed about $78 of that amount.[1] Nevertheless, the inflation-adjusted netback to oil producers – a rough indicator of profits per unit of output – was more than twice as high in 1981 as in 1972, even for oil discovered before 1974, and very much higher for oil discovered after that and for natural gas. Thus both prices and profits accelerated in the 1973-81 period, even after adjustment for inflation.

The picture was very different when we turned to output. Since 1969 Canada has been unable to

Table 6-6

Net Provincial Oil and Gas Revenues in the Western Provinces, Canada, 1967-82

	Manitoba				Saskatchewan				Alberta				British Columbia				Western provinces			
	Oil	Gas	Leases, etc.	Total	Oil	Gas	Leases, etc.	Total	Oil	Gas	Leases, etc.	Total	Oil	Gas	Leases, etc.	Total	Oil	Gas	Leases, etc.	Total
	($ Millions)																			
1967-68	1	-	—	1	18	—	17	35	107	23	108	238	7	3	24	34	133	26	149	308
1968-69	1	-	—	1	17	—	13	31	108	26	166	300	8	3	27	39	134	30	207	371
1969-70	1	-	—	1	16	—	12	29	125	27	120	272	9	4	27	41	151	31	160	342
1970-71	1	-	—	1	17	—	11	28	156	19	73	248	10	4	27	40	183	23	111	317
1971-72	1	-	—	1	16	—	10	29	186	21	81	289	10	5	32	47	214	27	124	365
1972-73	1	-	—	1	17	—	12	29	207	42	99	349	10	6	31	47	235	49	142	426
1973-74	1	-	—	1	20	1	13	33	371	69	128	567	17	6	26	49	408	76	166	650
1974-75	9	-	-	9	211	1	12	224	998	236	127	1,360	53	28	31	112	1,271	265	170	1,706
1975-76	8	-	-	8	185	1	9	195	1,027	500	182	1,708	43	202	40	285	1,263	703	231	2,196
1976-77	8	-	-	8	144	1	16	160	1,153	687	259	2,099	44	150	60	255	1,350	839	335	2,523
1977-78	9	-	—	10	205	1	22	228	1,388	960	800	3,148	42	150	213	405	1,644	1,110	1,036	3,789
1978-79	10	-	—	11	277	1	34	311	1,855	1,261	778	3,894	40	162	155	358	2,183	1,423	969	4,574
1979-80	12	-	1	13	279	1	65	344	2,001	1,472	1,130	4,603	47	321	230	597	2,338	1,793	1,426	5,557
1980-81	12	-	1	13	316	1	92	409	2,263	1,852	853	4,968	49	216	156	422	2,641	2,069	1,102	5,812
1981-82	13	-	2	15	250	1	59	309	2,467	1,898	663	5,027	67	220	70	357	2,797	2,118	793	5,708

SOURCE Unpublished data from Finance Canada, Federal-Provincial Relations Division, December 1983.

Table 6-7

Employment in the Oil and Gas Industry[1] in the Western Provinces, Canada, 1961-82

	Number of persons employed					
	Manitoba	Saskatchewan	Alberta	British Columbia	All western provinces	Canada
	(Thousands)					
1961	0.1	1.1	9.1	0.4	10.8	11.2
1962	0.1	1.0	9.2	0.5	10.9	11.2
1963	0.1	1.1	9.3	0.5	10.9	11.2
1964	0.1	1.0	9.4	0.4	10.9	11.2
1965	0.1	1.0	9.9	0.4	11.4	11.8
1966	0.1	1.0	10.5	0.5	12.1	12.4
1967	0.1	1.0	11.3	0.5	12.8	13.1
1968	0.1	0.8	12.1	0.4	13.3	13.6
1969	0.1	0.7	12.6	0.4	13.8	14.2
1970	0.1	0.6	13.4	0.4	14.6	15.0
1971	0.1	0.7	14.3	0.5	15.5	15.9
1972	0.1	0.7	14.9	0.5	16.1	16.6
1973	0.1	0.7	15.1	0.5	16.3	16.8
1974	0.1	0.7	16.4	0.5	17.6	18.2
1975	0.1	0.6	16.4	0.5	17.5	18.1
1976	0.1	0.6	17.4	0.5	18.6	19.1
1977	0.1	0.5	18.6	0.5	19.7	20.2
1978	0.1	0.7	20.2	0.5	21.5	22.0
1979	0.1	0.7	22.4	0.5	23.8	24.6
1980	0.1	0.9	24.8	0.4	26.1	27.4
1981	0.1	0.9	26.1	0.3	27.4	28.8
1982	0.1	1.0	28.7	0.4	30.2	31.7

1 Excluding oil sands employment.
SOURCE Based on data from Statistics Canada.

replace dwindling conventional oil production with new discoveries. Consequently, conventional oil reserves and production have trended downward; by 1981 Alberta's conventional oil output was more than 30 per cent below the peak output achieved in 1973. This unfavourable development was partially mitigated, however, by the increase in the production of synthetic crude. In 1967, well before the 1973 OPEC crisis, Great Canadian Oil Sands Ltd. started to produce synthetic crude from the Alberta oil sands. The OPEC crisis proved to be the trigger for Syncrude Corporation to build a large-scale oil sands plant, which came on stream in 1978. Still, the output from these plants was insufficient to compensate for the decline in conventional oil production. Total western oil output in 1981 was estimated to be 25 per cent below the level in 1973.

The natural gas situation was more encouraging. Output continued to increase until 1979, and the decline after that date was due more to federal regulation of export volume and price, to the general economic slowdown of the North American economy, and to the mild winter of 1982-83 than to production capability. Nevertheless, the National Energy Board estimated 1982 productive capability at about 108.3 billion cubic metres, which implies an annual rate of increase of 4.4 per cent for the 1973-82 period, compared with the average annual 14.1 per cent increase for the 1961-73 period.

Although the output growth of hydrocarbons in Alberta slowed down, the growth of the provincial economy did not. On the contrary, driven by the construction of the Syncrude oil sands plant, by the expectation of huge oil and gas profits, and by further expansion of the chemical industry, Alberta's real provincial product grew very rapidly. While Canada's overall economic growth rate slowed down to 3.1 per cent in the 1973-81 period from the 5.9 per cent rate in 1961-73, Alberta's remained at 6.6 per cent – unchanged from the rate for the 1961-73 period. Real domestic product per capita grew by 3.0 per cent annually, compared with 4.5 per cent in the 1961-73 period – much faster than the 1.9 per cent for Canada as a whole.

During this period of continuing strong growth, Alberta recorded an average unemployment rate of 3.3 per cent – well below the average of 7.5 per cent in the 1973-81 period for the country as a whole. Thus Alberta's unemployment rate not only remained below the national average, but the gap between the provincial and the national rate widened in the post-OPEC crisis period.

The very big price increases for oil and gas induced the provincial and federal governments to increase their royalty and tax rates. Alberta's net provincial oil and gas revenues increased more than fourteenfold between fiscal years 1972/73 and 1981/82. In 1979 the Alberta government could have covered all of its expenditures with its oil and gas revenues alone. But mindful of the fact that oil and gas are nonrenewable resources, the provincial government set up the Heritage Fund in 1976. Until recently, 30 per cent of all oil and gas revenues were paid into the Fund as savings for the future. The remainder was treated as general government revenue and was used to continue to forgo the provincial retail sales tax, keep the income tax rate some 10 per cent below that of other provinces, and pay off the outstanding debt of all Alberta municipalities in 1979.

Under such attractive circumstances it is not surprising that Alberta's population continued to grow much more rapidly than the national average – 3.6 per cent annually versus 1.2 per cent. This growth was driven by an extraordinarily high rate of interprovincial migration, averaging about 30,000 persons per year. Though net migration from Saskatchewan diminished, that from Manitoba increased. But these flows were completely overshadowed by the tremendous influx of migrants from central and eastern Canada, mostly from Ontario.

While Alberta succeeded in avoiding the slowdown in the Canadian economy during the 1971-81 period, the sharp and painful recession that occurred in 1981-82, from which the national economy has not yet fully recovered, hit Alberta too and with great severity. Many factors contributed to the Alberta recession. The growth rate of nonresidential construction activity over the 1973-81 period (16.0 per cent annually) was probably unsustainable in the long run anyway. The prolonged tension between the federal and provincial government about jurisdiction, pricing and taxation, the National Energy Program and its tendency to stimulate exploration on Canada lands, and the Alberta government's decision to reduce crude oil production prior to the Alberta/federal agreement all contributed to the uncertainties and the uneasiness. The extraordinarily high interest rates of mid-1981 and the heavy debt burden of many important companies in the petroleum industry were other unfavourable forces. Finally, plans for two big (Syncrude-size) oil sands plants were abandoned, and heavy oil projects and the construction of upgraders were postponed, generally contributing to depressed growth.

In 1982 Alberta's real gross domestic product suffered a sharp drop of some 4.5 per cent – a record about as bad as that of the national economy. In March 1983 Saudi Arabia reduced the price of its light crude oil to $29(U.S.) a barrel from the $34(U.S.) in force from October 1981, thereby further increasing the uncertainty about future petroleum prices. In early 1983 the National Energy Board granted additional natural gas export licences, but even the previously granted quantities were not taken up by U.S. purchasers. The export price set by the federal government, $4.94(U.S.) per thousand cubic feet, was not competitive in the United States, where a sudden surplus of domestically produced gas appeared on the market. In the spring of 1983 the federal government lowered the export price to $4.40(U.S.) and in the summer of the same year decreed an incentive price of $3.40(U.S.) for volumes taken in excess of 50 per cent of permitted volumes. Even so, 1983 gas export sales amounted to only 44 per cent of permitted volumes.

Opinions differ on how low Canadian export gas prices would have to fall before substantial additional export volumes could be realized, and some believe strongly that the short-term increase in gas exports that would follow a price reduction would not be sufficient to increase total revenues. In the medium term, some expect the U.S. gas surplus to disappear and, according to them, Canadian gas should then be salable at prices that are much more advantageous than they are today.[8] In the meantime, however, much Canadian gas remains shut in, and its owners may suffer from a severe cash shortage while paying high interest rates on debts incurred by drilling for oil and gas.

The Industry in British Columbia, Saskatchewan, and Manitoba

These general economic effects in Alberta apply to Saskatchewan and British Columbia as well; however, the importance of oil and gas output relative to the provincial product is much lower in the two neighbouring provinces than in Alberta. If we regard the importance of oil in Alberta in 1981 as 1.0, its importance in Saskatchewan was 0.388, and in British Columbia 0.030. Similarly, if the importance of natural gas in Alberta in 1981 were rated as 1.0, the corresponding figure for Saskatchewan would be 0.066 and for British Columbia 0.108.

In Saskatchewan over the past two decades, the importance of oil has tended to moderate. In 1961

Saskatchewan produced more than a quarter of the oil in the West, almost half of which was light crude (see Table 6-1). Oil output continued to increase in Saskatchewan until the mid-1960s, though more slowly than in Alberta. Also, during the 1961-66 period the relative importance of medium and heavy crudes increased, at the expense of the importance of light crude. Saskatchewan's crude output peaked in 1966 in absolute terms and has trended downward since then. By 1981 it stood at half the level of its 1966 peak and accounted for only 11.1 per cent of western oil production. The relative importance of Saskatchewan light crude oil production continued to shrink, as did that of medium crude, which reached its peak around 1966 and has declined since then. Heavy crudes are becoming more and more important, contributing now about one-third to Saskatchewan's output. These events underline the importance of research and development in the field of heavy oil upgrading and tertiary recovery to which the heavy oil research facility in Regina is expected to make important contributions.

The future of the Saskatchewan petroleum industry will crucially depend on three factors: the world price of crude; the technological progress made in heavy crude oil production and upgrading; and a price, tax, and royalty structure that properly reflects the value differentials of the various qualities of crude oil. Given a favourable combination of these factors, the petroleum industry will continue to make a valuable contribution to Saskatchewan's growth.

British Columbia's oil production has always played a relatively modest role. It peaked around 1970, producing about 6 per cent of western Canada's oil, and since then has declined in volume by 50 per cent to less than 3 per cent of total western oil production. British Columbia natural gas production is more significant. It reached a peak in absolute terms in 1973, when it amounted to 15 per cent of western gas production. Since then, output has declined by about 40 per cent and now accounts for 9 per cent of western output. Producing capacity in 1982 was estimated to be some 60 per cent higher than output; the production shortfall was due to the recession in Canada and to weak export markets.

In Manitoba the small but significant oil industry currently produces about 20 per cent of the province's needs. Significant drilling activity with a high success ratio promises to keep production growth in line with the future growth in oil consumption in Manitoba.

This review of past developments reminds us that the petroleum industry is very risky. At this juncture its longer-term future is more plagued by uncertainties than usual. We turn now to our view of what the future may hold for the oil and gas sector.

A Future Scenario, 1983-2000

In any view of the future of the oil and gas industry, the political uncertainties of the Middle East loom large. A military or revolutionary conflagration in that area would have completely unpredictable consequences for both the availability of crude petroleum and its price.

Aside from such tragic possibilities, international developments also hold many other uncertainties. On the oil supply side, the current price of $29(U.S.) has been in force for only a year – too short a time to assess its effect on the discovery of additional oil reserves. On the world demand side, experience has shown that, in the long run, consumers react to oil price increases with substantial cutbacks in consumption, through energy saving or switching to alternative energy resources. We also know that the big oil price increases since 1973 have coincided with, and possibly contributed to, the general economic slowdown in almost all countries, but we do not know to what extent a stabilization, or a moderate increase, in the present oil price would accelerate industrial production and the demand for oil.

Petroleum analysts maintain that they can predict productive capabilities from past discoveries and also the extent of future discoveries with tolerable accuracy. Yet unexplored areas still exist; and even in those which have been explored, the average exploratory drilling depth in Canada has not gone beyond 1,300 metres. According to some, surprises (perhaps favourable; perhaps not) may await us if we drill down 5,000 metres or more. Whatever the outcome, one thing is certain: deep drilling will not be cheap and will require an advantageous price/cost configuration. The same holds true for drilling in Canada's frontier regions. Interest rates play an important role in the determination of the profitability of conventional oil exploration and perhaps even more so in that of oil sands production. All these uncertainties are compounded by the unpredictability of future federal and provincial tax, royalty, and subsidy policies, which could render any or all of these sources of supply either profitable or losing propositions.

The tertiary recovery of light to medium crudes will be stimulated by the recent agreement between the federal and provincial governments that sets the New Oil Reference Price for incremental oil from tertiary recovery and includes an advantageous provincial royalty rebate program. For light to medium crudes, hydrocarbon miscible-flooding technology is now

generally accepted, and the current surplus of low-cost natural gas is making the technique attractive. A significant number of projects – at Judy Creek, Swan Hills, Rainbow, Wizard Lake, and Pembina – are either under way or under consideration.

But there are still uncertainties about the technical and economic feasibility of the tertiary recovery of heavy crudes. A favourable exception is the extra heavy crude of the Lindbergh/Elk Point area. In general, the large-scale application of tertiary recovery methods for heavy crude would require improvement in market conditions and further technological developments. The availability of upgrading facilities would act as a stimulant to heavy oil production.

Synthetic oil is produced by one of two techniques: the Suncor/Syncrude-type oil sands mining, followed by heat and chemical processing of the sand in the plant to obtain synthetic crude; or *in situ* steam techniques to obtain crude bitumen, which may or may not be upgraded into crude oil. Under current economic conditions, further Syncrude-type plants would not be profitable. More modest (1,500-2,000 cubic metres/day) *in situ* projects at Fort Kent, Wolf Lake, and Cold Lake are more likely to proceed, as there are now opportunities to market crude bitumen. Once output of 10,000 cubic metres/day or more is available in a given region, regional upgraders may be built to process the bitumen into crude oil.

The future for natural gas production may be more optimistic. Large amounts of natural gas are said to exist in the Deep Basin area of western Alberta and eastern British Columbia. But the most recent report of the Geological Survey of Canada has not yet evaluated the potential of the area, though it points out that to produce from this basin, greater drilling depths and more expensive production techniques would be required than for "conventional" gas.[3]

In view of all these uncertainties, we can indicate only general tendencies and trends. Most industry experts agree that the decline in the output of conventional oil in nonfrontier areas will continue.[4] They also generally agree on the approximate rate of decline, estimating the level of output in the year 2000 to be about 40 to 55 per cent below that of 1983. On the basis of our research, we believe that there will be somewhat more production from reserves as yet undiscovered than the consensus currently holds.[5] Recently there has been encouraging progress in the development of the tertiary recovery of conventional oil. Research currently in progress at the Council suggests that the existing tax and royalty arrangements for tertiary recovery are adequate under the present world price to ensure profitable and economically and socially efficient production. Adding output from all types of recovery (primary, secondary, and tertiary), our working hypothesis is that there will be a 30 per cent decline in output from conventional sources by the year 2000.

Opinions differ strongly about the future growth of synthetic crude production from oil sands. Estimates for the year 2000 range from 150 to 500 per cent of the 1983 level, the latter assuming a price of $260 per cubic metre (1981$). This would be equivalent to approximately $48 per barrel (1983$), while the current world price is about $36.25(Cdn.). In this study we assume that production from the oil sands will quadruple between 1983 and 2000 – an estimate that is in line with the projections of the Alberta Energy Resources Conservation Board.

But such expansion is likely to occur only if governments provide incentives.[6] Others maintain that even bigger increases are possible under the present price, cost, and tax environment, provided that the oil industry feels assured that governments will not change the taxes and royalties in the future.[7] In our opinion, an Alsands-type synthetic oil plant would be far from able to earn a 10 per cent real return at today's world price, even if it did not have to pay any taxes and royalties. (A 10 per cent real return is often used as a rough rule of thumb in deciding the economic viability of such projects.) The Wolf Lake *in situ* development seems able to produce bitumen at close to competitive prices and to earn a real 10 per cent return under the present tax and royalty regime, which provides a small subsidy to the project.

In all of the various projections the total expected production of conventional and synthetic oil in the year 2000 adds up to approximately the same quantity produced in the early 1980s. In other words, not much change in oil output is predicted. Those who expect a relatively smaller decline in conventional oil output also expect a smaller increase in synthetic oil production, while those who forecast a large decline in conventional oil output believe that the reduction will be offset by a large increase in synthetic oil production, as Canada strives to attain oil self-sufficiency.

Some research results suggest that a slight subsidization of oil output may be justified. If any quantity of oil can be sold at world prices in Canada or abroad, while the volume of exports of other commodities can be increased only by lowering their price, then a cautious policy of oil production subsidies can be defended.[8] This subject is very contentious among economists. Further research is required, and the social gains and losses must be quantified, because the danger of wasteful subsidization is great.

While there is a reasonable degree of unanimity about the future level of total oil production, the same

cannot be said about natural gas output. Some experts envision a very substantial increase (50 per cent) in western natural gas production in the 1980s, with a strong decline in the 1990s.[9] Others maintain that there are still large undiscovered reserves in the West that could be brought on stream.[10] Also, the National Energy Board has in recent years shown a tendency to revise its gas deliverability forecasts upward.[11] On balance, we are inclined to expect a 60 per cent increase in production between 1983 and 1991 and the maintenance of the 1991 level to at least the year 2000. This implies that discoveries of substantial new reserves will compensate for the gradual exhaustion of current reserves.

We regard our oil and gas assumptions as reasonable. If they err, however, they probably err on the optimistic side. Yet it must be remembered that they represent a very significant slowdown compared with the 1961-83 period because both output and price growth will be slower. On the output side, oil production is assumed to remain level in the period from 1983 to 2000, while it grew by 3.7 per cent annually during the 1961-83 period. We assume that natural gas production will grow by 2.8 per cent annually, compared with the rate of 6.6 per cent during the 1961-83 period. The output growth of the petroleum industry during the remainder of this century will probably provide some driving force to the economy of the western provinces but not as much as it did during the 1961-83 period. Petroleum and gas prices are similarly expected to have weaker stimulating effects in the years to come than they did in the last two decades. The world price of oil increased by an average inflation-adjusted compound rate of 11 per cent yearly in the 1961-81 period. Today the consensus is that the price rise for the 1981-2000 period will hover around an inflation-adjusted 2 per cent or less.

Alberta's provincial revenues from natural resources – mainly oil and gas – grew tremendously between 1961 and 1983. Both the volume of production and the price of oil and gas rose, permitting large increases in royalty rates and royalties. Government revenues from natural resources increased by an annual average of over 20 per cent from 1961 to 1983. In the projection period this growth rate will slow down substantially. Oil discovered before 1974 will be gradually exhausted. "New" oil and production from the oil sands will increase, but their royalty rates are much lower. An average growth rate in resource revenues of 3.5 to 4.0 per cent annually in the 1983-2000 period seems reasonable, with a considerably higher growth rate expected during the 1980s than in the 1990s.

With growth in oil and gas output stabilizing gradually and their price increases moderating, we expect Alberta's extraordinary economic growth rate of the 1960s and 1970s to give way to one that is more in line with, or even slightly lower than, the overall national rate, which is estimated to average about 3 per cent annually over the 1983-2000 period. This projection for Alberta is based on calculations that also take into account the developments in other resource industries, manufacturing, construction, and the service industries. The unemployment rate, which until recently was well below the national average, can be expected to come closer to the national figure. We expect slow, long-term improvement in the national unemployment picture and that it will range between 6 and 7 per cent by the end of the century. Alberta's population growth rate will moderate, from the average annual rate of 2.6 per cent in the 1961-81 period to within the range of 1.5 to 2.0 per cent. Lower fertility rates will exert downward pressure on population growth, while net migration into Alberta is likely to continue as long as oil sands plants are being built. Real wage rates, which are currently more than 10 per cent above the national average, will grow more slowly than in the past and slower than the rate expected in the rest of Canada. This will lead to a gradual reduction in real wage differentials. We expect that the Alberta manufacturing industry will grow slightly faster than the provincial economy, but the moderation in population growth will slow down the improvements in productivity to be derived from growing economies of scale and agglomeration economies.

We recognize that the history of the oil and gas industry has been full of surprises and that it will continue to be in the future. It is therefore impossible to make a categorical judgment about the economic outlook for Alberta – a province in which the industry plays such an important role. This outlook simply represents our current best judgment. Indeed, because the western oil and gas industry is beset by several uncertainties, we must also investigate the effects of alternative courses of future developments.

Some Possible Alternatives

The main source of future hydrocarbon output growth is expected to come from natural gas. The assumed increase implies a very substantial increase in exports – from the 19.2 billion cubic metres per year in 1983 to about 75.7 billion cubic metres in 1991, gradually declining to 55.7 billion cubic metres in 2000 – as Canadian requirements increase and as export licences are limited in order to provide for domestic needs.

Canadian export licences permitted the export of some 48 billion cubic metres in 1983, but the export price decreed by the Canadian government rendered much of this export opportunity noncompetitive.

Canadian gas contending for the U.S. market has to compete with U.S. and Mexican gas and also, in the industrial segment of the market, with residual oil and coal. In a market like that of natural gas in the United States, which is characterized by a wide variety of local conditions, a bureaucratic mechanism of uniform price setting does not, and cannot, take advantage of the opportunities of rapidly changing markets and prices. Consequently,

12 We recommend that the Canadian government and the natural gas industry continue to seek more flexible means of realizing the economic potential from Canadian exports of natural gas. We also recommend more reliance than at present on negotiated prices; however, as long as the federal and state governments in the United States are involved in the gas industry, there will continue to be a need for involvement by the federal government in Canada.

We recognize that some changes toward flexibility in natural gas exports have already been introduced in 1983 and 1984. We welcome these, but our work suggests that further worthwhile steps along these lines should be considered.

If frontier oil and gas production in the Arctic proves technically and economically viable, it would stimulate Alberta's economy, because much of the Arctic activity is serviced from Alberta. We must avoid the temptation to overestimate the importance of this possibility, however. Assuming, as an extreme case, that employment generated by servicing the Arctic eventually equaled the total employment in the Alberta oil and gas industry in 1982, it would still amount to only 4 per cent of Alberta's current labour force. The employment and output effect of building a pipeline from the Arctic would have a further substantial, though temporary, effect.

Another alternative worth exploring assumes heavier production of synthetic oil and bitumen. Currently the growth is most likely to come from the gradual expansion of *in situ* production. Although this technique is still in an experimental stage, we assume that technological and scientific progress will result in the production of 119,000 cubic metres per day of synthetic oil by the year 2000, instead of the 79,000 cubic metres per day included in our basic outlook.[12] We also assume that the economics of the additional synthetic crude production is such that it will not yield any additional royalties.[13]

Under such assumptions, output and employment in Alberta's oil and gas industry would increase more than in our basic projection. This would create demand and employment in the other industries and would at least temporarily lower the unemployment rate and increase wages and the migration flow from the rest of Canada. The population increase would, in turn, further increase the demand for the output of Alberta industries. We estimate that the effects of producing more synthetic oil and bitumen would accelerate Alberta's economic growth rate by about 0.5 per cent (per annum). The additional migration to Alberta would increase the growth rate of the population by 0.2 per cent and that of the gross provincial product per person by 0.3 per cent. With the additional stream of migrants, Alberta's unemployment rate would move towards the national rate. Increased population and higher overall economic activity would accelerate the growth rate of manufacturing output by 0.4 per cent.

Evidently, progress in lowering oil sands production costs and increasing synthetic oil production would contribute to Alberta's economic growth. Nevertheless, such measures would not re-create the resource boom conditions of the 1970s.

The effect of taxing natural resource profits has been a much-debated subject. Interestingly, we find that increased taxation of oil and gas profits would, provided it did not depress hydrocarbon production, increase the economic growth of the taxing province.[14] Higher taxation of oil and gas would enable the provincial government to lower other taxes and/or provide more or better government services. These "fiscal benefits" would increase the attractiveness of the province and induce migration to Alberta. The population increase would induce economic growth, but this growth would be lower in percentage terms than the population increase, thus reducing the provincial product per person. Thus the resource taxation would raise provincial growth but lower the standard of living; it would also lower the gross national product because it would induce migration to a destination where the productivity is lower. This effect of increased resource taxation assumes that resource output and prices remain constant. With increasing output and/or prices, the effect would be strengthened. It would also be strengthened if the Alberta government were to decide to distribute a part of its resource revenues directly to all residents of Alberta.

In previous chapters we observed that many westerners perceive the economies of their provinces to be less stable than those of the central provinces. Some regard diversification into manufacturing as desirable because they believe that this would result in more stability. The question arises whether, under such circumstances, it might not be advisable to use part of the western provincial oil and gas revenues to stimulate manufacturing production.[15] Such stimulation could take various forms; for example, manufacturing output might be subsidized, or capital investment in manufacturing might receive favourable tax treatment. Our research suggests that policies like

these, requiring direct financial assitance to firms would, to a large degree, be self-defeating. The provincial revenues used to stimulate manufacturing would not be available for other possible uses, such as more or improved government services and lower income or sales taxation. As a consequence, the stimulating policy would have a minuscule, and possibly negative, effect on the growth rate of the standard of living. However, we consider an alternative way of stimulating manufacturing, in Chapter 13, not subject to those drawbacks. While this method has more chance of success, it is likely to provide at best a minor stimulus.

Conclusion

We have no doubt that the oil and gas industry will continue to contribute to western economic growth. Alberta will continue to grow, but the growth will be slower. Policy adjustments in the energy field would make only a slight difference. Despite this, growth in the province will be comparable to that in the rest of Canada. Even better prospects are possible; but our reasons for thinking so cannot be fully justified until we have further analysed the potential in other sectors, notably in the service industries.

7 Agriculture

Agriculture is basic to the history of western Canada. Prairie soil attracted farmers from central and eastern Canada in the drive to open up the last great frontier, and waves of immigrants arrived in the West to build their homesteads. British Columbia's development has been much less determined by the fortunes or failures of farming; but, even there, many communities were rooted in agricultural pursuits. And while urbanization, technology, and specialization have transformed the way of life in western Canada, as elsewhere, it would be wrong to consider agriculture of waning importance.

Since the focus of this report is the future economic prospects for western Canada, our attention is directed in this chapter to factors that are central to the vitality of the western agricultural industry, particularly that of the Prairie provinces. Here we highlight those trends and market developments which are expected to be of utmost importance. But first, we present a very brief overview of the industry.

A Bird's Eye View of Western Agriculture

By way of introduction, Chart 7-1 shows that primary agriculture accounts for more than 5 per cent of the output in the West, compared with 3 per cent for Canada as a whole. The processing of agricultural produce, as represented by the food and beverage industry, accounts for a further 1.6 and 2.4 per cent, respectively. Still, and perhaps surprisingly, even in the West (except for Saskatchewan) primary and secondary agriculture accounts for only a minor share of the total gross provincial product. This, of course, is due to the pervasive influence of the service and trade sectors, which together account for some two-thirds of all output. Since this is true across Canada, a more useful measure for comparison is the contribution of agriculture to the total value added of goods-producing industries (Chart 7-2). Clearly, the agricultural industry is a major factor for the three Prairie provinces, especially for Saskatchewan. In British Columbia, agriculture plays a minor role, although in certain areas of the province it is a rich resource.

Close to 300,000 persons are employed in the western agricultural industry and related secondary manufacturing. Processing jobs in the food and beverage industry account for nearly 18 per cent of the total. The employment contribution of agriculture varies considerably from province to province, being highest in Saskatchewan – where approximately one-fifth of the labour force is employed in the industry – and lowest in British Columbia. Agriculture accounts for 11 per cent of total employment on the Prairies. The industries that supply and service the agricultural industry are also substantial and provide employment for many. Some experts maintain that proper government action could promote the growth of industries that supply, or are supplied by, agriculture. But this could only be achieved economically and efficiently if the private markets were not functioning properly. Later in this chapter we shall cite an instance where government assistance could be helpful for meat exports.

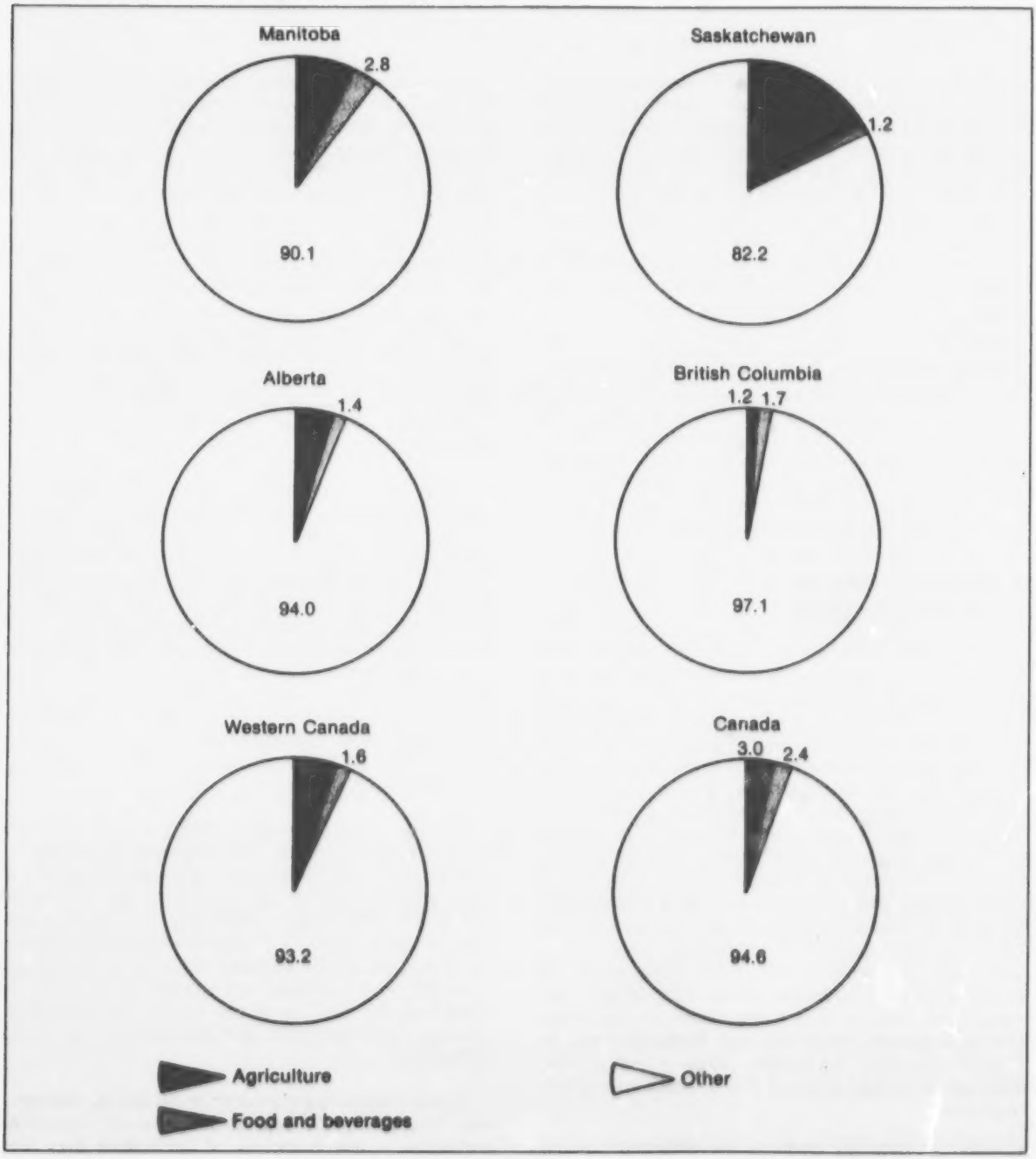
Table 7-1 shows the composition of the primary agricultural industry in western Canada. The 195,000 farms in the four western provinces, covering 140 million acres, had sales of over $10 billion in 1982. Over 60 per cent of that was accounted for by crop production; the remainder, by livestock and poultry production. While cereals, oilseeds, livestock, and poultry account for more than 85 per cent of western farm sales, fruit, vegetables, milk products, and eggs provide a livelihood for many thousands of farmers and make a valuable contribution to Canada's economy. The processing of primary products in the West added $2 billion to Canada's gross domestic product in 1982.

By several measures agriculture is a huge industry; under the right domestic and international conditions, it has vast potential. Its direct and indirect impact is registered throughout all sectors of the economy. Industries that supply materials, machinery, and services for agricultural production are vitally affected by the state of the industry. And since household incomes on the Prairies are influenced to such an extent by the fortunes of this sector, industries that provide consumer goods and services are also vitally influenced.

In this chapter we concentrate on grains, oilseeds, and specialty crops, and on the livestock and meat industries – the branches of agriculture that first come to mind when we think of the western provinces. Nevertheless, fruit, vegetables, potatoes, sugar

Chart 7-1

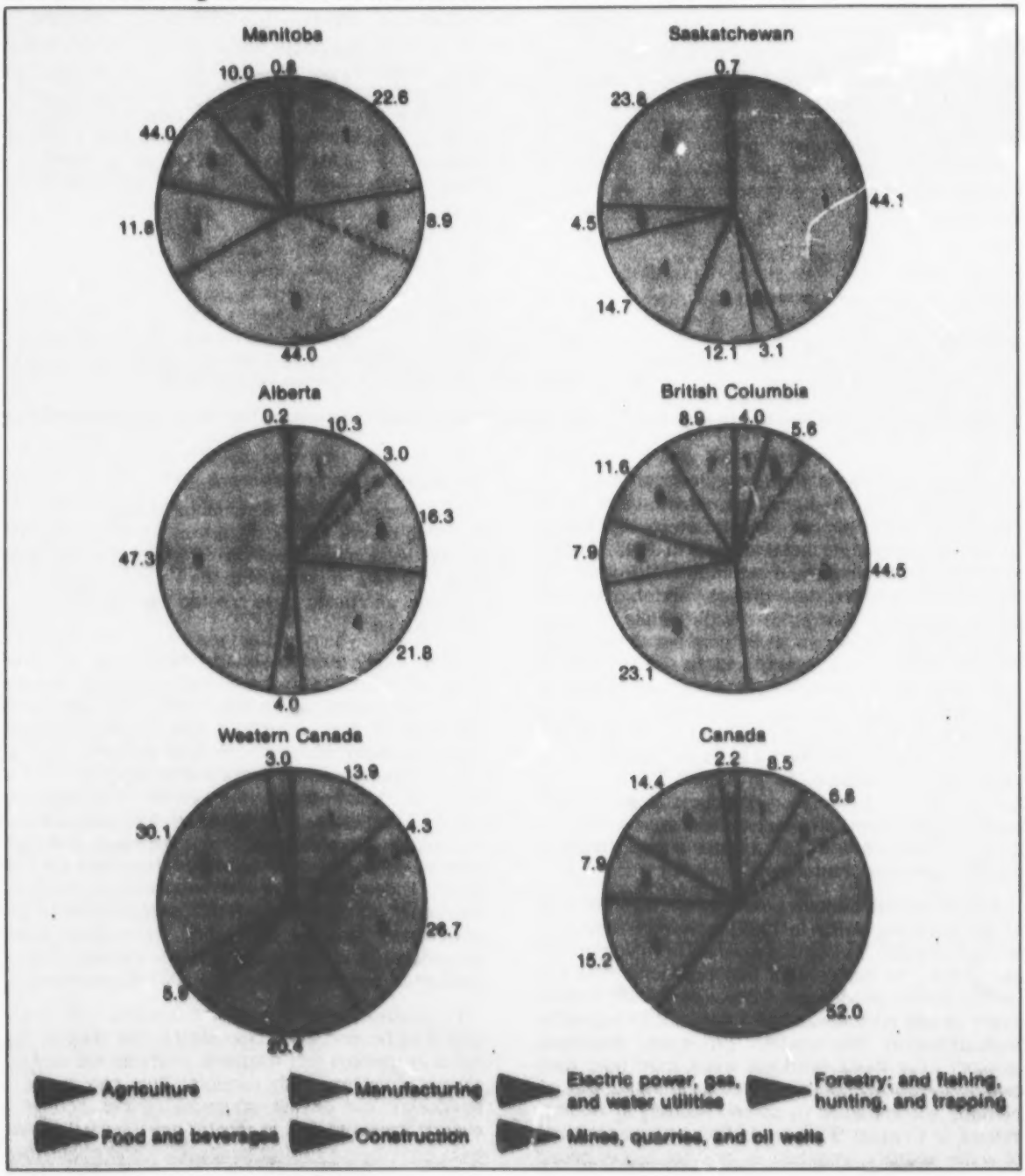
Contribution of Agriculture to the Gross Provincial Product of the Western Provinces, Canada, 1981



SOURCE Based on data from Statistics Canada.

Chart 7-2

Contribution of Agriculture to the Gross Domestic Product of Goods-Producing Industries in the Western Provinces, Canada, 1981



SOURCE Based on data from Statistics Canada.

Table 7-1

Sales of Selected Agricultural Products in the Western Provinces, Canada, 1982

	Manitoba	Saskatchewan	Alberta	British Columbia	Western provinces
			($ Millions)		
Cereals and oilseeds	886	3,196	1,845	48	5,975
Fruit and vegetables	45	5	37	190	277
Other crops	60	64	29	36	189
Total crops	991	3,265	1,911	274	6,441
Livestock and poultry	503	644	1,466	261	2,874
Milk products	96	65	209	217	587
Eggs	44	17	43	58	162
Other livestock	20	13	26	21	80
Total, livestock, poultry, and related products	663	739	1,744	557	3,703
Total sales[1]	1,654	4,004	3,655	831	10,144

1 Excludes corn, sugar beets, floriculture and tree nursery stock, forest and maple products, and tobacco, as well as sheep.
SOURCE Based on data from Statistics Canada.

beets, and floricultural and tree-nursery products are also important to western agriculture; these crops accounted for almost one-quarter of British Columbia's total agricultural receipts in 1982. Apples and raspberries were the most important fruit crops, followed by strawberries, grapes, and blueberries. British Columbia also grows a wide variety of vegetables, accounting for about 30 per cent of Canada's total mushroom production, and has a substantial floricultural and tree-nursery industry. In Manitoba and Alberta, these products play a relatively smaller role. In Manitoba, potatoes account for most of the produce income, followed by sugar beets and a variety of other vegetables. In Alberta, potatoes and floricultural and tree-nursery products are important crops; sugar beets and vegetables are also significant. In Saskatchewan, these crops account for less than 0.2 per cent of total farm receipts.

Altogether, the western provinces (with 29 per cent of Canada's population in 1982) received 91 per cent of the Canadian agricultural revenue from sugar beet production, 39 per cent of fruit production, 32 per cent of potato production, 28 per cent from floriculture and tree nurseries, and 21 per cent of vegetable production. In the western provinces, therefore, receipts from these products more than hold their own and will likely continue to do so in future, though perhaps accompanied by some instability in income. Indeed, in Chapter 9 we argue that under conditions of water scarcity, irrigation of land for higher-priced products like fruit, potatoes, and other vegetables is more justified than for grains and pasture.

Instability of Farm Income

The legacy of the agricultural industry, with its recurring booms and busts, is very much at the heart of the westerners' feelings of insecurity. Gyrating world markets, together with the vagaries of weather, diseases, and pests, have created wide fluctuations in farm income.

While many are too young to have had any first-hand experience with the Great Depression and the dust bowl conditions of the 1930s, the community response to that experience still deeply influences Prairie thinking. More recent developments, such as the plummeting wheat exports and sagging prices in 1968-69, followed by the boom conditions of 1974-75, serve to remind farmers that their lot is a precarious one. Many do extremely well, but they have to do well sometimes to tide them over the bad times. Those who have not been able to build up significant equity in their farm operations or to put aside cash reserves could find themselves facing foreclosure and bankruptcy. The industry had a number of casualties during the 1981-82 recession.

In addition, the agricultural industry has many problems beyond those discussed in this chapter. It is not only receipts that fluctuate; costs do too and not always in unison with receipts. This can result in temporary, but painful, squeezes on net income or even in bankruptcies. In recent years several factors have contributed to cost increases. Land prices have risen substantially over the past decade. Many farmers operate under a high debt-to-equity ratio.

This, in combination with relatively high interest rates, constitutes a heavy burden for them. The recently decreed increase in the freight rate for statutory grain, which is discussed in Chapter 10, will further increase the squeeze on net farm incomes. Under such circumstances it is not surprising that young people are so cautious about going into farming and that our farm population is aging. Moreover, the provinces sometimes follow policies that worsen the economic problems of their agricultural sectors – such as the aggressive beggar-thy-neighbour policies that promote agricultural autarchy. An example of this is evident in our discussion of the poultry industry.

The widely publicized farm bankruptcies in the 1980s conveyed the impression of an agricultural industry in serious financial trouble. Indeed, some farm organizations lobbied against changes in the Crow rate structure on the grounds that higher transportation costs would drive the already financially troubled grain producers out of business (Table 7-2).

Financial collapse involves severe hardship for both the farmer and unsecured creditors. But while the tragedy is real, it is important to keep it in perspective. Our competitive, market-determined economy is frequented by casualties in all sectors – not just the agricultural sector. What should be noted from Table 7-2 is that the total number of farm bankruptcies is very small. The casualty rate (0.13 per cent in 1982) is much lower for farmers than for many other groups. Farmers face numerous problems, but general financial collapse is not often one of them. Nevertheless, farmers are sometimes forced by economic circumstances to sell out at a capital loss. Clearly, then, the pressing issue is the lack of income security and a decent rate of return on investment and effort.

Just how unstable is farm income and what are the major factors that contribute to instability? These are important questions. To help us probe these issues, let us look at the actual data on farm income. Clearly there have been dramatic ups and downs. Saskatchewan farmers have had some boom times, such as in 1974-75, but also some very rough times. Swings in farm income in Alberta and Manitoba have also been dramatic.

More significant, however, is the average amount of variation in farm incomes from one year to the next and what a farmer must anticipate in judging income from one year to the next. As an example, Table 7-3 shows that in the 1964-81 period, Manitoba's net farm income varied from year to year by almost 26 per cent. Thus if a farmer normally had a net income of $30,000, he needed to anticipate swings of $7,800 either way. Farm income may, in fact, register even more pronounced swings, but barring exceptional circumstances, this sort of instability is to be expected. Not surprisingly, net farm income is much more variable than gross farm receipts. Farmers in the Prairie provinces have high fixed overheads; when their crops are bountiful and prices are good, gross revenues exceed those overheads by a wide margin and net revenue is excellent; but when crops are poor and prices weak, net revenue shrinks more severely percentagewise than gross revenue.

Table 7-2

Farm Bankruptcies in the Central and Prairie Provinces, Canada, 1979-83

	Quebec		Ontario		Manitoba		Saskatchewan		Alberta		Canada	
	A	B	A	B	A	B	A	B	A	B	A	B
1979	1	14	8	65	-	1	2	14	5	16	17	125
1980	2	44	19	123	4	14	12	16	4	8	44	222
1981	-	54	21	140	3	14	4	19	2	18	31	261
1982	4	143	52	176	17	30	7	24	3	24	83	410
1983[1]	3	91	45	139	17	47	17	36	23	36	110	390

A - Bankruptcies of field-crop farms.
B - Total farm bankruptcies.
1 January to October 1983.
SOURCE R.M.A. Loyns and C. A. Carter, "Grains in Western Canadian Economic Development to 1990," Economic Council of Canada (forthcoming).

Table 7-3

Instability of Farm Incomes on the Prairies, Canada, 1926-81

	Average annual variation	
	Gross revenue per farm	Net revenue per farm
	(Per cent)	
Manitoba		
1926-45	31.2	53.3
1946-63	21.3	27.0
1964-81	14.2	25.6
Saskatchewan		
1926-45	45.0	104.0
1946-63	17.8	25.9
1964-81	15.2	28.8
Alberta		
1926-45	33.6	51.9
1946-63	15.3	20.2
1964-81	12.3	19.6

SOURCE J. Jobin, "*L'instabilité des revenus agricoles dans les Prairies*," Economic Council of Canada (forthcoming).

Table 7-3 also shows that, over the 1926-81 period, income instability diminished. The long-run trend masks periods of gross instability. In the 1930s farmers suffered through the Great Depression, and a protracted drought turned the Prairies into a large dust bowl. Farm income plummeted, then rebounded sharply during the Second World War, causing farm incomes to vary by more than 100 per cent in the case of Saskatchewan and by more than 50 per cent in the cases of Manitoba and Alberta. The postwar period, however, has been much more stable, and net incomes, on average, have varied by some 25 per cent.

More recently the situation has been even better. Because of the introduction in 1976 of the Western Grain Stabilization Program, participating farmers now have some protection against significant declines in revenue associated with a decline in overall grain sales. Still, instability in farm incomes remains worrisome, for insurance is far from a perfect substitute for earned revenues, and the structure of international markets will further exacerbate this problem in the future. Clearly, a smoother growth path in farm incomes would be much more desirable.

Farmers in other areas of Canada also experience great instability in their incomes – for example, the tobacco growers in southern Ontario. The problem is especially acute for farmers in the Prairie provinces, however, because of both the importance of agriculture to the region and the degree of swings in market conditions. A better understanding of what contributes most to instability would be helpful in designing measures to alleviate or cushion the problem. Furthermore, investigation of the issues involved should provide some insight into the need for diversification and determine whether there is a role for policy initiatives that would promote a more desirable distribution of production. Finally, it should enable us to judge whether instability in farm income is worsening or improving.

What are the sources of instability for the Prairies? Is it due primarily to variations in the yields from cereal crops, or does livestock production also contribute significantly to it? Within these two very broad categories of agricultural output, what types of activity, and what factors, tend to contribute most to the instability in farm income?

We examined these questions by what is called "component analysis"; that is, we measured the impact of a number of key variables – for example, prevailing prices, acreage seeded, and number of animals slaughtered – on farm revenue.[1] Here, we simply summarize our main findings:

- For the three Prairie provinces, grain crops are a much more unstable source of income than livestock operations; indeed, the variation in income from grain crops tends to be more than twice that in income from livestock operations.
- Because grain crops so dominate agricultural output on the Prairies and because of their intrinsically unstable nature, this type of operation is the major source of income instability; indeed, it accounts for 91 per cent of income instability in Saskatchewan, 79 per cent in Manitoba, and 77 per cent in Alberta.
- Of all the cereal grains, oilseeds, and specialty crops, revenue from the production of canola has fluctuated the most widely, followed in descending order by that of flax, barley, and wheat. Because wheat so dominates cereal crop production, however, it is the major source of instability. Cereal grains, oilseeds, and specialty crops are grown in combination, so that the overall result is the combined effect of a particular set of crops grown in one particular year.
- The variation in price explains more than 50 per cent of the instability in revenues from wheat; the variation in the volume of production is primarily the effect of weather and disease, as the area seeded tends to be relatively stable. In contrast, most of the instability in revenues from canola and flax is explained by variations in the amount of acreage devoted to those crops.
- Although revenues from canola and flax vary widely, they appear to be a source of instability only

in Manitoba. In Saskatchewan and Alberta, they act to offset variations in other crops, thus helping to stabilize overall revenues.

- And for livestock production, beef is the dominant output and the primary source of instability; however, veal and pork production contribute considerably more to instability than might first appear.

- The instability in revenues from beef production is derived equally from the variations in slaughtering and price.

In summary, income instability for Prairie farmers has many causes. Because wheat and beef production account for the major share of the western agricultural industry, these two activities are the roots of the problem. Price variations, too, explain at least 50 per cent of the income instability. Wheat prices, in particular, determine the net revenue position of well over half of the Prairie farmers.

The structure of international markets exacerbates the problem of income stability for Prairie farmers. This is best illustrated through wheat prices. For Canada, the international price of wheat is vitally important, since more than three-quarters of our production is exported. Canada is essentially a "price taker," because the effect of our output on the international price is slight. Thus farm-gate prices in Canada are a close reflection of the international price, after taking into account the transportation costs to export markets. Table 7-4 indicates that the farm-gate prices on the Prairies became more volatile in the 1964-80 period than in the immediate postwar period. They now vary from year to year by some 25 per cent, on average, whereas for many years after the Second World War they varied by only 15 per cent.

Table 7-4

Volatility in Farm-Gate Wheat Prices on the Prairies, Canada, 1926-80

	Average variation in wheat prices
	(Per cent)
Manitoba	
1926-45	34.6
1946-63	14.1
1964-80	23.8
Saskatchewan	
1926-45	37.2
1946-63	15.1
1964-80	24.7
Alberta	
1926-45	37.2
1946-63	15.4
1964-80	24.5

SOURCE J. Jobin, "*L'instabilité des revenus agricoles dans les Prairies*," Economic Council of Canada (forthcoming).

Is there an explanation for this increased volatility that goes beyond the vagaries of weather and crop failures? We think there is. The increasing intervention by governments of major wheat-producing countries in their agricultural sectors is making the equilibrating process between international demand and supply increasingly difficult.

Two features of government are salient. First, the communist-bloc countries and many developing countries with exchange controls strictly regulate their imports of wheat, and price is much less a determinant than is normally the case. Sometimes a string of years with high grain imports by countries with centrally planned economies is followed by a period of low imports. This in itself would be sufficient to create instability in Canadian agriculture. In addition, many wheat-producing countries, Canada included, subsidize wheat production by direct or indirect means; the EEC countries, especially France, have support prices that are higher than the domestic equilibrium price and, in some years, even higher than the international price. Canadian governments and farm organizations are dissatisfied with the limited accomplishments of GATT on such agricultural issues. Some exporters think that the provinces and the industry should strive to become more directly involved in international agricultural trade policy formation.

The first feature means that a change in price has relatively little effect on the amount demanded internationally. The second feature means that domestic prices are not allowed to fall; hence domestic consumption fails to absorb wheat surpluses. Alternatively, when wheat shortages occur, fixed domestic prices fail to ration domestic demand and to free up more exports. In combination these demand and supply features result in an increasingly volatile pattern for wheat prices.

Similar impediments to a smoothly functioning international market exist for livestock and other components of the western agricultural industry. Details on this are presented later in this chapter. Suffice it to say here that the future for the western agricultural industry is very complex and difficult to judge. To appreciate what the future may hold, it is necessary to investigate more thoroughly both the grain trade and livestock production.

The Grain Trade[2]

Wheat is the largest, single grain crop, by volume and value, in Saskatchewan and Manitoba, but the volume of barley usually exceeds that of wheat in Alberta (Table 7-5). Barley is the second largest crop, by volume and value, in Manitoba and Saskatchewan. Canola has a high value per tonne; nevertheless, it ranks a distant third in each province. Manitoba's production is the most diversified, with corn and soybeans having begun to appear in southern Manitoba. Alberta, however, has the most diversified agricultural industry overall, with livestock value approaching the combined value of wheat and

Table 7-5

Volume and Value of Production of Principal Grain Crops on the Prairies, Canada, Ten-Year Average to 1981

	Manitoba				Saskatchewan				Alberta			
	Volume		Value		Volume		Value		Volume		Value	
	1981	10-year average	1981	10-year average	1981	10-year average	1981	10-year average	1981	10-year average	1981	10-year average
	('000 tonnes)		($ Millions)		('000 tonnes)		($ Millions)		('000 tonnes)		($ Millions)	
Wheat	3,326	2,336	598.8	323.6	14,288	11,450	2,688.0	1,673.3	6,221	4,103	1,149.8	595.7
Oats	463	677	47.1	56.4	817	1,086	67.5	90.0	1,249	1,282	128.8	118.3
Barley	2,330	1,644	298.5	162.5	3,331	3,085	439.1	309.0	6,967	5,182	864.0	518.9
Rye	175	82	25.6	9.4	330	183	47.8	20.7	320	187	45.7	21.3
Flax	262	245	83.7	68.7	150	186	46.8	51.6	56	67	17.1	19.3
Canola	306	298	85.7	78.4	748	818	212.5	215.7	760	803	209.7	211.9
Corn	432	110	45.7	12.6	--	--	--	--	30	6[1]	5.0	3.1
Sunflowers	171	91	42.0	21.1	4	4	1.5	0.7	--	--	--	--
Other[2]	142	78	36.4	16.1	68	59	22.5	12.7	29	30	10.2	7.4
Total[3]	7,616	5,568	1,263.5	748.8	19,741	16,875	3,545.7	2,373.9	15,643	11,774	2,430.3	1,495.9

1 Three-year average, 1979-83.
2 Includes buckwheat, dry peas, and mustard seed.
3 Includes forage seed.
SOURCE R.M.A. Loyns and C.A. Carter, "Grains in Western Canadian Economic Development to 1990," Economic Council of Canada (forthcoming).

Table 7-6

Grain Sales and Total Agricultural Sales on the Prairies as a Proportion of Gross Provincial Product,[1] Canada, 1982

	Grain sales as a proportion of total agricultural sales	Proportion of GPP[2]	
		Grains sales	Total agricultural sales
		(Per cent)	
Manitoba	60.3	7.4	12.3
Saskatchewan	80.7	20.8	25.8
Alberta	50.6	3.7	7.3
Prairie provinces	65.0	7.6	11.7
Canada	45.9	2.5	5.5

1 Or gross national product in the case of Canada.
2 These figures exaggerate the importance of grains and total agricultural production as contributors to GPP or GNP, since sales do not reflect value added.
SOURCE Based on data from Statistics Canada.

barley production. Saskatchewan is by far the most specialized province, producing mainly Canada's traditional high-quality wheat. Clearly, the Prairie region is far from homogeneous, even in agricultural output (Table 7-6). Four-fifths of the agricultural production in Saskatchewan is that of grain, and its importance in terms of gross provincial product is over five times that for Alberta and twice that for Manitoba. But, in each province, grain sales account for more than 50 per cent of total agricultural sales.

The overriding factors that have determined the important structural differences in agricultural production between the three Prairie provinces have been the climatic conditions, moisture, and soil types. Another significant factor has been the regulatory framework, in which the federal government has promoted high-quality wheat through production quotas and the development of several varieties. Saskatchewan topography is particularly suited to growing high-quality wheat. The proximity to markets influences the degree to which specialty crops are favoured. Southern Manitoba, for example, has taken advantage of its somewhat more direct access to U.S. and European markets by diversifying into such specialty crops as sunflowers, mustard, and canary seed.

Yields Are Up Sharply . . .

In all three Prairie provinces the volume and value of grain production have increased significantly since 1971. The volume of grain production has increased by about 2 per cent per annum, while the real value over the past decade has increased at an average annual rate of about 6 per cent. During the 1960s, the volume of grain production expanded at twice the rate of the 1970s; nevertheless, the real value of production declined.

Alberta has experienced the fastest rate of growth since 1971. After adjusting for the effects of inflation, the real value of crop production doubled in Alberta between 1971 and 1981, with wheat contributing the most to this increase. A 25 per cent reduction in summer fallow contributed greatly to this expansion. Manitoba cut its summer fallow even more dramatically, but the real value of production increased by 50 per cent, or at half the rate in Alberta. Saskatchewan has maintained a consistently high proportion of its cropland in summer fallow (over 35 per cent); its real value of production increased by only 22 per cent between 1971 and 1981.

The increased productivity per acre seeded also contributed to the growth of grain production across the Prairie provinces. Productivity is always difficult to measure but particularly so in agriculture. Yield increases per acre are not a very satisfactory measure of productivity, since too many variables change to enable useful conclusions. Aside from the increased use of fertilizers, pesticides, and other such factors, better climatic conditions may have prevailed during the past decade than prior to it. Empirical studies have estimated productivity increases of about 1.8 per cent annually during the 1960s and 1.1 per cent annually during the 1970s.[1] While this productivity increase is modest, even for the 1970s it cumulates to more than a 10 per cent improvement. Since the mid-1970s, significant new varieties of wheat, feed barley, canola, and flax have been a key factor in the productivity increases. The production potential of flax, for example, has been strengthened by as much as 20 per cent since 1976.

Having looked at the volume and value of grain production on the Prairies, we now turn to trends in nominal and real prices over the past 20 years for Canadian wheat, barley, corn, and canola (Table 7-7). Nominal prices were relatively flat throughout the 1960s; they dropped significantly in the early 1970s and then rose dramatically in 1973 through to 1976. From 1961 to 1981 wheat prices tripled, and canola prices nearly quadrupled. Corn and barley prices increased by two-and-a-half times. The "real" prices of grain give a much less buoyant picture. Deflating nominal prices by the all-items consumer price index indicates that, except for canola, all prices declined between 1961 and 1981. "Real" prices were extremely low in 1971 because of the world glut of grain, but they rose significantly between 1973 and 1976. For the 1970s there a was considerable strengthening of real prices but not enough to compensate fully for the slump in the 1960s. Still, both the volume and the value of Prairie grain production have improved over the past 10 to 12 years.

Three underlying factors have contributed to this improvement: the increase in acreage seeded, the increase in productivity, and the increase in real prices (Table 7-8). During the 1970s the improvement in real prices was the most consistent, positive influence for all three major crops, especially for wheat. Not surprisingly, the acreage seeded in wheat showed strong gains across the Prairies, although the acreage seeded in canola increased just as rapidly in Alberta and even more rapidly in Manitoba. Less emphasis was placed on barley production in Saskatchewan and Manitoba, although the declines there were offset by increases in Alberta. The improvement in yield per acre, which is a proxy for productivity, showed a mixed performance. Alberta had the best productivity record for all three crops, but canola was the star for enhanced output per acre.

Table 7-7

Nominal[1] and Real Prices[2] of Specified Grains, Canada, 1961-81

	1961		1966		1971		1976		1981	
	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
	(Dollars per tonne)									
Wheat	63.20	84.27	64.67	77.45	49.60	49.60	105.46	70.83	185.19	78.17
Barley	48.23	64.31	48.23	57.76	31.69	31.69	88.19	59.23	127.23	53.71
Corn	47.64	63.52	57.87	69.31	46.45	46.45	88.18	59.22	132.67	56.00
Canola	79.37	105.83	106.91	130.43	95.24	95.24	267.64	179.74	279.98	118.18

1 Nominal price is the estimated annual average in Canada.
2 Real price is the nominal price deflated by the consumer price index - a proxy for removing the effect of inflation (1971 = 100).
SOURCE R.M.A. Loyns and C.A. Carter, "Grains in Western Canadian Economic Development to 1990," Economic Council of Canada (forthcoming).

Table 7-8

Factors Underlying Changes in the Value of Grain Production on the Prairies, Canada, 1960-80

	Average annual increase or decrease in value								
	Manitoba			Saskatchewan			Alberta		
	Wheat	Barley	Canola	Wheat	Barley	Canola	Wheat	Barley	Canola
	(Per cent)								
1960-70									
Acreage seeded	-3.2	7.5	23.9	-2.6	4.7	1.6	-3.0	-0.8	18.5
Yield per acre	3.0	5.3	2.3	4.7	6.7	2.1	4.2	3.8	0.2
Real prices	-5.3	-5.5	-1.4	-4.9	-5.0	-1.0	-5.3	-5.9	-1.5
1970-80									
Acreage seeded	5.7	-0.7	8.2	5.4	-4.4	1.3	6.1	4.7	6.1
Yield per acre	0.3	1.0	0.5	--	-0.5	2.6	1.4	2.0	2.7
Real prices	3.1	2.4	2.2	3.5	3.3	2.2	3.8	3.0	2.3

SOURCE J. Jobin, "*L'instabilité des revenus agricoles dans les Prairies*," Economic Council of Canada (forthcoming).

The contrast between the 1960s and the 1970s is striking. In the earlier period both acreage seeded and real prices declined sharply, while yield per acre increased remarkably. At the risk of oversimplication, it appears that the depressed market conditions of the 1960s forced retrenchment to the most productive areas and crops; for example, canola production increased considerably. During the 1970s better prices allowed for rapid expansion at the expense of productivity.

The dramatic increase in gross receipts during the 1970s was tailed by rising input costs. Operating costs increased sharply, following the spiraling interest charges, rising fuel and seed costs, and much higher prices for fertilizers and pesticides. The structure of the capital base, particularly in machinery and equipment, also changed substantially. Table 7-9 shows the cost increases that farmers have experienced over the past 20 years. These reflect, in part, the effects of more intensive agricultural production methods and a general expansion of the agricultural sector. Unfortunately, cost data per unit of output are not readily available; hence it is difficult to judge the cost squeeze for farmers. Nonetheless, we do know that the increased costs pertained to

Table 7-9

Agricultural Production Costs on the Prairies, Canada, 1961-81

	1961		1971		1981		Change over decade: 1961-71		Change over decade: 1971-81	
	Prairies	Canada	Prairies	Canada	Prairies	Canada	Prairies	Canada	Prairies	Canada
	(Millions of 1981$)						(Per cent)			
Operating costs:										
Taxes	141.5	270.6	161.1	278.4	136.3	227.6	13.9	2.9	-15.5	-18.2
Gross farm rent	176.9	255.1	198.3	295.7	468.3	623.0	12.1	15.9	136.2	110.7
Wages to labour	230.4	727.5	204.5	732.2	351.7	1,073.3	-11.2	0.6	72.0	46.6
Interest	170.9	313.3	315.2	632.5	1,092.5	2,279.9	84.4	101.9	246.6	260.5
Fuel and lubrication	402.2	644.0	370.1	627.3	681.8	999.0	-8.0	-2.6	84.2	59.3
Machinery repairs	363.0	613.0	434.4	762.1	647.2	1,056.0	19.7	24.3	49.0	38.6
Fertilizer	52.2	243.7	136.0	379.1	642.2	1,081.6	160.5	55.6	372.2	185.3
Pesticides	38.6	74.4	39.3	104.7	312.2	482.3	1.8	40.7	694.4	360.6
Seed	40.5	95.9	71.8	231.0	106.5	309.4	77.3	140.9	48.3	33.9
Depreciation on buildings	54.1	168.7	75.4	263.7	150.3	449.7	39.4	56.3	99.3	70.5
Depreciation on machinery	536.4	844.3	649.1	1,046.7	1,290.3	2,011.9	21.0	24.0	98.8	92.2
Capital costs:										
Land and buildings	13,352.8	27,225.9	20,787.9	40,075.8	62,845.1	103,275.1	55.7	47.2	202.3	157.7
Machinery and equipment	4,802.5	8,118.7	5,463.0	9,253.6	11,102.7	17,442.2	13.8	14.0	103.2	88.5

SOURCE Based on data from Statistics Canada.

interest charges, fertilizer outlays, pesticide outlays, and outlays for land and buildings.

Perhaps of more interest are the relative shifts in production costs over the past two decades (Charts 7-3 and 7-4). Although the cost of everything has gone up, for some components the increase has been more rapid than for others.

The most dramatic increase has been in interest on indebtedness. Interest payments as a proportion of total production costs were about 5 per cent in 1961; by 1981 they had risen to over 15 per cent. This percentage dropped marginally to almost 14 per cent in 1982, in accordance with the sharp decline in interest rates. Some claim that mounting interest charges are seriously undermining the agriculture industry. On closer inspection, the problem seems to be that farm debt is very unevenly shared. For example, in 1981 almost one-third of the farmers in Saskatchewan had no debt; one-third owed $25,000 or less; and the remaining one-third held most of the farm debt in that province. The implications of a rising debt burden are serious, both for those currently encumbered and for those wanting to enter the industry.

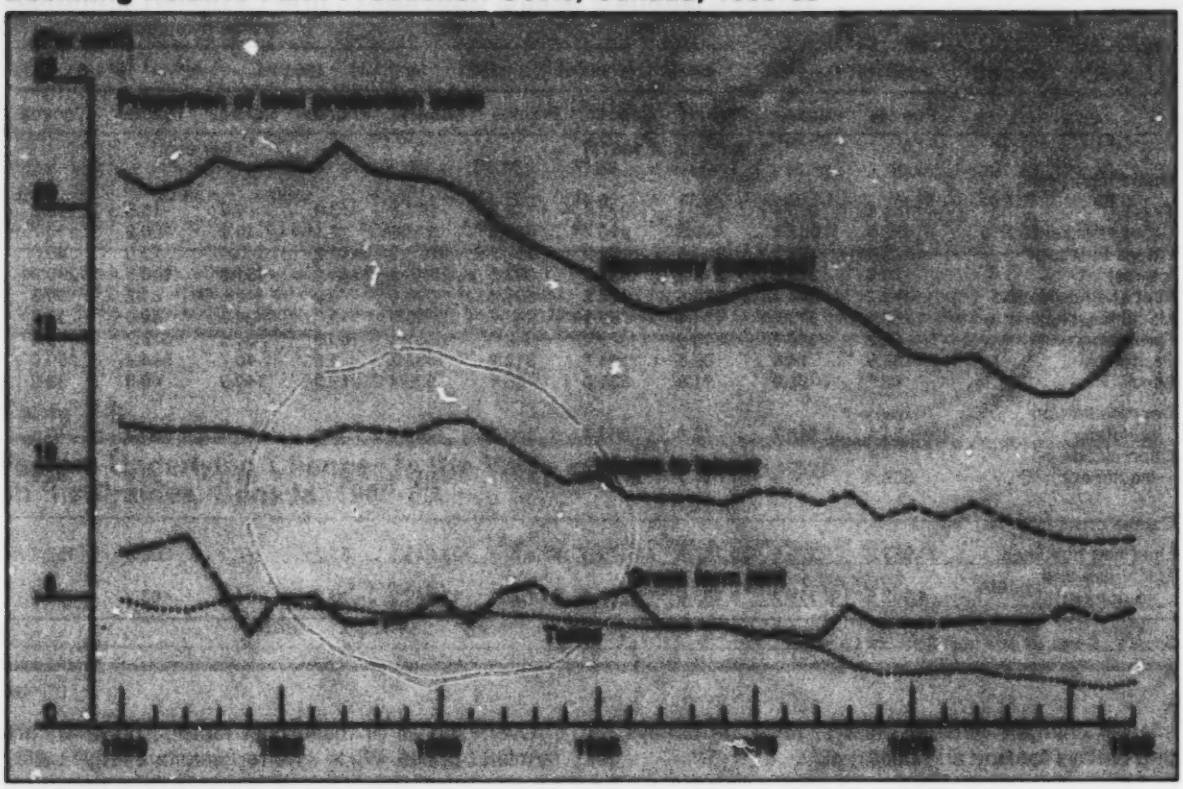
Overriding all of these cost factors, however, are farmland prices. While land represents a huge outlay for the new farmer, it is also a rapidly appreciating asset. Farmland prices increased fourfold in Saskatchewan between 1971 and 1981, and even more so in the other two Prairie provinces. This constitutes a boon to those who entered the industry several years ago but a formidable barrier to current entrants. The distribution of capital gains from appreciating land prices greatly complicates the evaluation of how well, or how poorly, farmers have fared over the past decade.

To illustrate just how important the land factor is, consider a typical Saskatchewan farmer in 1971. At that time the average holding of land was 600 acres, and the market price per acre was approximately $70. Ten years later the price was $345 per acre, for a capital gain of $165,000. Thus a $42,000 outlay in 1971 proved to be an excellent investment, even after discounting for the opportunity cost of capital. This consideration must be borne in mind when discussing the general welfare of farmers and the overall state of the grain industry.

The adequacy of farm income and rates of return are very difficult to ascertain from aggregate data.

Chart 7-3

Declining Relative Farm Production Costs, Canada, 1950-82



1 Includes fuel and repairs.
SOURCE Based on data from Statistics Canada.

Apart from the problem of measuring the nonpecuniary income associated with farming, the distribution of income within the industry must also be considered. Nonetheless, we can conclude that the western grain trade entered the 1980s in a healthier state than it was in at the outset of the 1970s. Although the boom conditions of the mid-1970s tempered and were followed by large grain inventories in 1978, widespread drought in 1980, and an ill-timed frost in Saskatchewan in 1982, these were exceptions to a generally improved financial picture for western grain farmers.

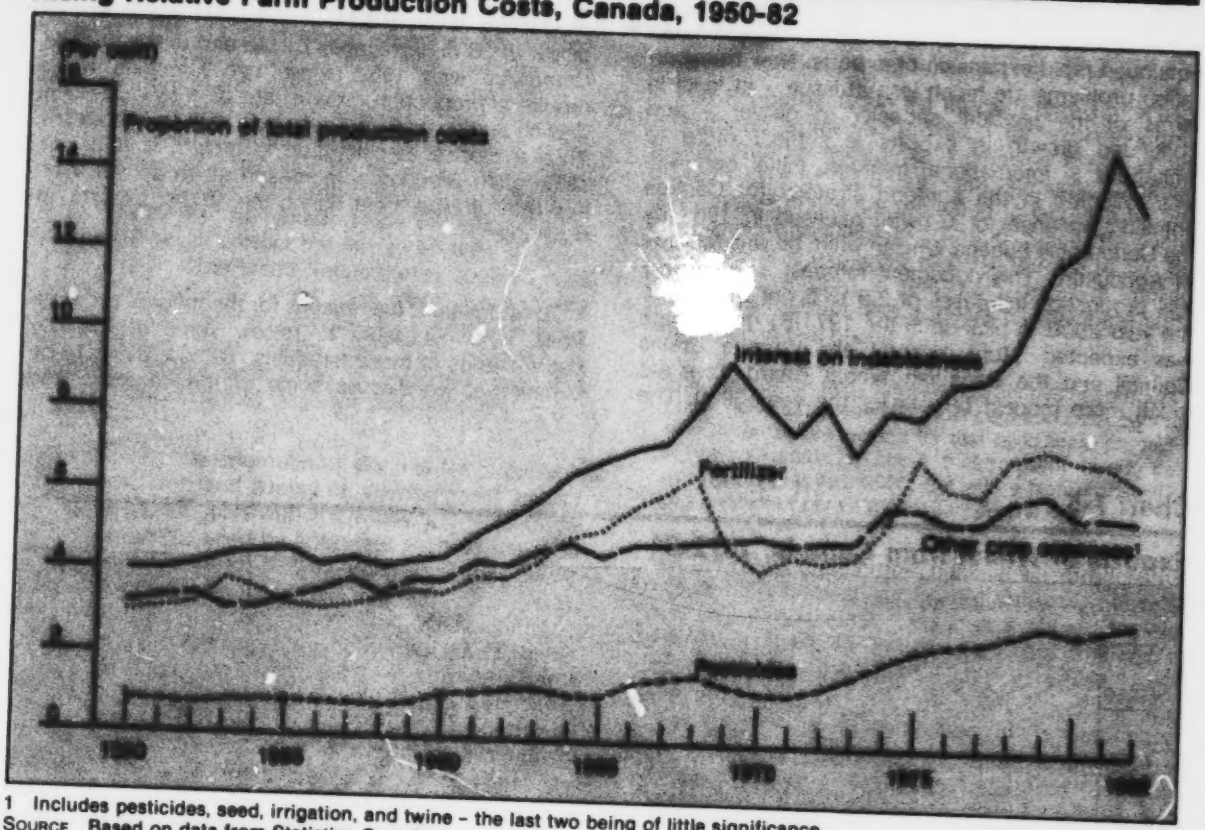
Clearly, real net revenue per farm has been improving slowly. Cost escalations have indeed been serious; but net farm income, even after adjusting for the effects of inflation, is now – in Saskatchewan – almost three times what it was during the 1969-70 slump, when farm incomes were particularly depressed. Alberta farmers are more than twice as well off, while Manitoba farmers have experienced some recent erosion of earlier gains.

To note this improvement is not to say that the financial situation of Prairie farmers is sound. Farm incomes are still low, and increasingly farmers are supplementing their incomes from off-farm sources. Farm tax filers in Saskatchewan reported in 1979 that almost half their income was derived from off-farm sources. Furthermore, the return on their invested capital may be very low. For example, Saskatchewan farmers earned a net return of $1 billion in 1982 on nearly $31 billion of capital assets – a return to capital of 3.2 per cent, assuming no return at all to labour or management.[4]

These estimates underscore the need to be concerned about the future prospects of the western

Chart 7-4

Rising Relative Farm Production Costs, Canada, 1950-82



1 Includes pesticides, seed, irrigation, and twine – the last two being of little significance.
SOURCE Based on data from Statistics Canada.

grain industry. We wish to emphasize, however, that the measurement of farm income is beset by many problems, that farm income and farmer income can be very different; and that financial and welfare problems are borne by some farmers, while others do exceptionally well.

The Future Prospects for the Western Grain Industry

The overall buoyancy of the western grain trade is determined by a host of supply and demand factors. Supply-side considerations include the rising costs of production; changing grain transportation rates, arising from the recent "Crow" legislation; transportation bottlenecks; and factors such as soil degradation. On the demand side, price is the most obvious determinant, but the exchange rate also plays an important part. In addition, changing forms of competition, surplus dumping, altered consumer demand, and volatile international markets are all factors that the western grain farmer must face.

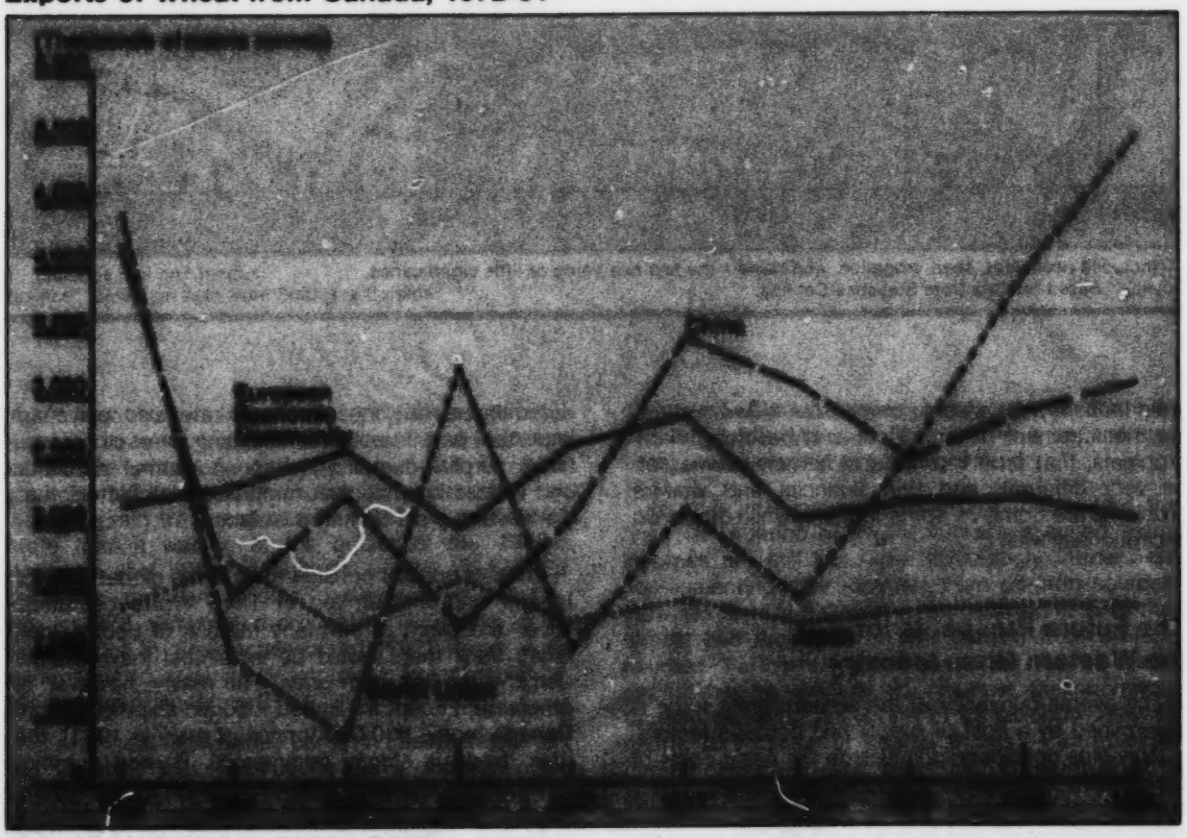
Another popular consideration is the global issue of hunger and malnutrition in Third World countries. Given the plight of so many millions of people, one might think there would be an almost inexhaustible demand for Canadian grain. The reality, however, is otherwise. Except for limited food aid shipments from Canada (some 600,000 tonnes of grain in 1981), the grain trade is strictly commercial. Barring a major change in foreign aid policy over the next decade, the issue of global hunger and malnutrition will continue to have a negligible influence on agricultural output in the Prairie provinces.

Forecasts of Canadian grain production and exports have been marked by notable downward revisions. At the outset of the 1980s transportation bottlenecks were seen to be retarding the otherwise continued rapid expansion of exports. Now transportation problems are much less at issue – at least in terms of the physical capacity to deliver – and continued growth in exports is subject more to limitations in international markets. Initial optimism was reflected in the agrifood strategy for Canada entitled *Challenge for Growth*, released in 1981 by the Honourable Eugene Whelan when he was Minister of Agriculture. This document forecast annual average production increases of 2.5 to 3 per cent up to the year 2000. A pick-up in the 1971-81 growth rate was expected. More recently, the Canada Grains Council and the Canadian Wheat Board have set much more modest targets for the year 1990. The Canada Grains Council projects that Canada will produce 50 million tonnes of grain by then and export 34 million tonnes. The Canadian Wheat Board has a production target of 54 million tonnes and an export target of 36 million tonnes by the end of the decade. Compared with 1982, these two forecasts would require a production growth rate of 1 to 2 per cent and an annual export growth rate of 2 to 3 per cent. Thus a modest deceleration in growth is foreseen, since grain production increased at an annual average rate of 2 per cent during the 1970s; exports, at 4 per cent.

To understand the reasons for the modest expectations, it is necessary to review some of the key determinants of these forecasts. Without trying to be exhaustive, we discuss some of the domestic and

Chart 7-5

Exports of Wheat from Canada, 1972-81



SOURCE Based on data from Statistics Canada.

international factors that are expected to bear most importantly upon the western grain trade.

Since most grain-producing countries have intervened to make a sharp distinction between the international market and the domestic market, it is not surprising to find that different prices prevail in the two markets. Canada has had a two-price wheat policy since 1967, although its exact form has altered considerably. Very generally, floor support prices have been fixed for wheat sales in the domestic market, so as to protect the farmer at least to some degree from depressed international prices. And when international prices are very strong, the Canadian consumer is protected by a maximum price for domestic sales. Since over three-quarters of Canada's wheat production is exported, it is the international price that plays the dominant role.

Essentially, the international price is fixed through the demand for, and supply of, *internationally* traded wheat in conjunction with the many forms of trade barriers that are used by importers such as the EEC and Japan, on the one hand, and the export subsidies that exist for exporters such as the United States and the EEC, on the other. The communist-bloc countries, many developing countries, and some western industrialized countries (e.g., Japan) closely regulate the level of imports allowed in any given year – a level considerably influenced by the success of their own crops. Western surplus producers, principally the United States and Canada, act as residual suppliers.

Given institutional rigidities, it is easy to see why the international price for wheat is so volatile. If major importing countries, such as the Soviet Union or China, suffer crop shortfalls and reach out to offset the shortfall, the international price can skyrocket, as happened in 1974-75. Chart 7-5 traces the instability of Canada's international markets. Of particular note are Canada's wheat exports to the Soviet Union and China. The fact that Canada has no monopoly power over the international price for wheat follows from its contribution to world production and from our share of world trade. It is worth noting that Canada's total grain production is less than 3 per cent of world grain production. Our share of world trade in grains is 7 per cent for coarse grains and 18 per cent for wheat.

Future Prices and Production

Since the international grain prices are the result of global supply and demand factors, it is particularly hazardous to make long-term price predictions. Several authorities have attempted forecasts; these vary a great deal, and none are very optimistic. The long-term trend for most major grain prices has been downwards, and the consensus seems to be that this will continue.

The Economic Council's medium-term projections incorporate a specific provision for expected grain prices. After a decade of increasing at an annual average rate of 14.5 per cent, nominal Canadian grain export prices are projected to increase by only 3.8 per cent annually up to 1990. Since the overall inflation rate is expected to be in the 4.5 to 5.0 per cent range, a drop in real grain prices is implied. Agriculture Canada also appears to anticipate some weakening in real prices:

> The agrifood strategy foresaw real agricultural product prices rising at between 0.75 per cent and 2 per cent a year. Now we are looking for real agricultural product prices to remain at about their present levels, on average, to the year 2000, but with a high probability of a modest (1 per cent per year) decline.[5]

Of the major grain crops, nominal wheat prices are expected to perform best but yet not well enough to keep ahead of inflation. Canola and soybean prices, at least over the next few years, are forecast to decline – even in nominal terms.

The pessimistic price outlook may appear to indicate reduced output from grain production in western Canada. It is normally supposed that, over the long haul, a decreasing real price for any product will inhibit growth in its output. But this need not be so, for at least three reasons. First, productivity improvements could offset unfavourable price developments by reducing costs. Indeed, on a world scale the unfavourable price developments may be largely the consequence of productivity improvement. For Canada, if productivity improvement were rapid enough, the expected downward price trend would not inhibit output growth. Second, a run of favourable climatic conditions could increase supply even if price developments would otherwise have decreased it. Third, land prices are a key cost that could affect the ease of entry into the industry.

Land prices move in response to product prices. These movements can mitigate both the output-encouraging effect of rising prices, and the output-discouraging effect of falling prices. If land prices move more than is warranted by the product price movements because of speculation, the normal effect of prices on output may even be temporarily reversed for as long as the speculation persists. For these and other reasons, we cannot automatically conclude that output growth in any period will slow down because

real prices are expected to fall during that period. Recent history shows this vividly. During the 1960s, for example, the volume of grain produced in western Canada increased by 4.5 per cent annually despite a sharp drop in real prices. Moreover, the rate of growth in the 1970s dropped to half the former rate as price conditions improved materially.

Nevertheless, it would be unwise to bank on factors other than productivity growth, such as favourable climate or land price developments, to offset the normal inhibiting effect of falling prices on supply growth. In other words, supply expansion and increased Canadian sales in world markets will almost certainly require steady productivity improvement in agriculture over the coming years. That is not necessarily cause for concern, despite some recent slowdown in the rate of productivity growth. Over the last 50 years productivity moved up adequately, on average, to allow production and sales to improve in the face of a 50-year downward trend in real prices. Can such productivity improvement continue? We think so, but let us look nevertheless at three particular factors that could influence the likelihood of this happening: transportation, soil resources, and variable inputs.

First, until quite recently, transportation bottlenecks were feared as a serious impediment to expansion of the western grain trade. But the final passage of the Western Grain Transportation Act and the phasing-in of substantially higher freight rates have reduced concern over this problem (see Chapter 10). Besides, there have been remarkable productivity improvements in grain handling throughout the delivery system. The Saskatchewan Wheat Pool, for example, has reduced its elevator staff by 10 per cent over the past eight years; yet it has increased the volume handled by almost 80 per cent. Similarly, there have been big productivity gains at the ports. Still, much remains to be done to ensure that whatever growth could, and should, occur in western grain production is not stymied by transportation bottlenecks. One of the most sensitive areas yet to be resolved is that of labour-management relations. A disagreement between a small group of employees and a small group of employers or a single employer could tie up the entire transportation system and threaten Canada's reputation as a reliable exporter.

Second, western grain production could conceivably be expanded considerably by bringing into production an estimated 1.7 million hectares of potential cropland on the Prairies, by reducing the amount of land in summer fallow, and by arresting, or reversing, degradation of the soil resource.

Soil salinity in the Prairie provinces has been steadily worsening and now seriously affects some 10 per cent of the cultivated area. Some soil scientists, like Dr. D. A. Rennie of the University of Saskatchewan, are pessimistic about the consequences of this trend for future grain production. Erosion and the loss of organic matter are also major sources of soil degradation. Solutions do exist, however; some of the most commonly accepted are continuous or extended cropping, reduction in summer fallow, reduced or minimum tillage, and increased use of forage crops.

The Prairie Farm Rehabilitation Administration (PFRA) has estimated that the amount of summer fallow on the Prairies could, and should, be cut roughly in half. The Canada Grains Council has suggested a more conservative cut in summer fallow of 20 per cent.[6] This is possible; but, in either case, such cuts would require new technology in moisture conservation and preservation, weed control, and equipment.

Third, more intensive farming techniques hold the potential for considerably expanding production. Indeed, Prairie farmers took steps in that direction during the 1970s. Fertilizers and pesticides were utilized much more liberally, and new varieties of seeds were introduced, raising yield per acre quite considerably. Technological improvements in farm equipment have enhanced productivity and are helping to preserve and enrich the soil base. Crop mix and rotation have also advanced, resulting in higher yields and more flexibility in response to market opportunities. Prairie farmers are also proving to be highly adaptable and are taking advantage of educational opportunities to strengthen their hand in keeping farming operations up to date. There has been a proliferation of private, public, and university extension programs and short courses to help the farmer keep abreast of new techniques and agricultural advances. Many more university graduates are participating in the industry. Family farms are still the backbone of Prairie agriculture, but they have grown in size, and a number are now incorporated. The human resource factor, in short, appears to be a very positive feature.

Unfortunately, the research effort in support of the Prairie farmer is much less positive. The research needs are not only substantial, but specific. The research effort is not commensurate with the importance of the grain trade, nor has sufficient effort been made to import and diffuse technology. Furthermore, published economic research on grain markets and marketing is limited, and funding for such research is insufficient. In addition, these limited funds are not directed to where the pay-off might be greatest; more emphasis should be given to specialty crops and

barley, and the costs and benefits of publicly funded research should be assessed more rigorously. Finally, ways need to be found to increase the research sponsored, or undertaken, by the private sector – for example, by fertilizer and pesticide manufacturers, feed manufacturers, and large farm corporations.[7]

Provided that steady productivity improvement is obtained, some expansion of output seems likely. Given the decline expected in real prices, however, it seems unlikely that there will be strong growth in the real value of grain output. Most likely there will be some growth but at a distinctly slower pace than in the 1970s, when output and real price grew together.

Our expectation is that the grain industry on the Prairies will not be a major source of growth for the West in the medium to long term. Given average climatic conditions, production will continue to expand but much less aggressively than in the past. The grain industry has been very unstable, and there is no reason to believe that things have improved on this score. Rather, it appears that international prices are becoming even more volatile and Canada's markets more unsure. Thus initiatives should, and can, be undertaken to strengthen the outlook. Two distinct but related courses of action are possible: one would reduce income instability; the other would strengthen our ability to produce and sell more grain internationally, even in the face of poor price prospects.

Initiatives to Moderate Income Instability

The problem of income instability for western grain farmers has been eased in recent years by rising nominal prices and by the establishment of the Western Grain Stabilization Program. With rising grain prices, the financial health of the grain industry has greatly improved. Since 1976, moreover, the Western Grain Stabilization Program has more or less guaranteed the participants a safety net against falling international prices, crop failure, or a cost spiral.

The Western Grain Stabilization Program is highly subsidized. Over the span of seven years the federal government has contributed some $600 million to the Program; farmers have contributed another $300 million. Thus the problem of income instability for Prairie grain farmers has been shared by all Canadian taxpayers through the provision of subsidies to farmers when net farm revenues have fallen below average for extended periods of time.[8] In the past, participating farmers contributed 2 per cent of their gross revenues to the Program, and the federal government supported this contribution by a further 4 per cent. Since January 1984, these shares have changed to 1.5 per cent for farmers and 3.5 per cent for the federal government. If the net revenue of a farmer falls below the average for the previous five years, then the whole of the difference is made up by direct cash payments. Payments amounting to $368 million were made in 1977 and 1978, when international prices weakened.

The reduced revenue instability brought about by the Western Grain Stabilization Program does not mean that the problem has been resolved. On the contrary, as the international price for wheat become more (not less) unstable, markets for Canadian grain change and become less certain. Also, the favourable weather conditions that prevailed, on average, during the 1970s could deteriorate in the 1980s. And while there are insurance measures for these contingencies, they are very costly.

Although the Stabilization Program is a very important support program for the Prairie farmer, it is far from the only one. For example, the Crow freight rate subvention from the federal government has as a base payment $600 million annually. Also, since 1967, Canada has had a two-price wheat policy that guarantees a minimum floor price to the producer for wheat sold in the domestic market. Still the fundamental causes of instability have not been resolved.

The vagaries of weather and international markets mean that it is impossible to replicate for the Prairie farmer the stable growth pattern of the service sector. Consequently,

13 We recommend that Canada strengthen its efforts to seek an International Wheat Agreement.

Since international grain prices are so important to Prairie farmers and have been the major source of income instability, it is very much in Canada's interest to seek again an international accord that would better regulate the grain trade. From 1949 to 1968, in fact, multilateral contracts were in effect between major exporting and importing countries. Even during this period there were considerable problems, and since 1968 the accords have degenerated into the current "free-for-all." Since the 1978-79 International Wheat Agreement negotiations foundered, the world grain market remains without an agreement to use internationally controlled grain stocks as a stabilizing mechanism. Some experts have suggested exporter cooperation, aimed at raising world prices to a genuinely competitive level, and the removal of barriers to trade and of export subsidies. Such efforts, however, are hampered by very divergent interests between exporting and importing countries, and even within these two groups. Nevertheless, it is

essential that cooperation between grain exporters be improved and strengthened.

The important point to recognize is that Canada should not wait for depressed international markets before seeking international cooperation. Rather, it should press hard now for solutions to highly protected and subsidized grain production, in the interests of both income stability and expanded market opportunities. Into the bargain we may have to abandon certain policies, such as Canada's two-price wheat policy, in order to better ensure equilibrium between domestic and international markets. And we may also have to improve our storage facilities and inventory management, on and off the farm. Next, it may be possible to decrease instability by longer-term contracts and bilateral bargaining, including countertrade.[9] In general, we favour international trade liberalization and do not approve of specific arrangements like countertrade. International trade in grain is far from free, however, and is indeed heavily influenced by government policies and even direct interference. Under such circumstances, to reject countertrade would be to undermine our own position. Therefore,

14 We recommend that Canada seek to diversify its grain markets by bilateral bargaining and countertrade.

The growing dependence on the communist bloc for Canada's grain exports is worrisome. If longer-term assurances regarding the commercial prospects for trade with communist-bloc countries are not attainable, through offering discount prices or other benefits, Canada will have little choice but to work hard to diversify its markets. This will not be easy, as the opportunities are limited. It will likely require less emphasis on high-quality wheat, so as to allow greater participation in the coarse grains market. There may be room for improvement in market development, promotion, and sales effort with respect to all the grains. Passage of the legislation to establish Canagrex presumably reflects the perceived need to enhance our ability to market agricultural products abroad. More information about the activities of the Canadian Wheat Board, together with direct participation by producer interests in market development and promotion, could strengthen Canada's grain trade. Bilateral agreements between Canada and developing countries, involving trade items other than grain, may also be necessary to open up new markets.

The consequences of instability for the individual farmer can also be better compensated. Therefore,

15 We recommend that Canada strengthen the Western Grain Stabilization Program.

In recognition that the key variables affecting the net incomes of grain farmers are beyond the direct control of governments, a first-rate insurance policy is essential. The Western Grain Stabilization Program represents a big step forward, but experience with the Program since its inception in 1976 has revealed a number of shortcomings. The high rates of inflation between 1976 and 1982, for example, undermined the real value of the Program. Protecting the net revenues of farmers on the basis of their average receipts over the past five years is reasonable in a stable-price period, but inflation at 10 per cent or more a year can quickly erode the security intended. Adjusting the program to overcome this problem is one of the key strengthening elements that we have in mind.

Table 7-10

Current and Proposed Contributions[1] to the Western Grain Stabilization Program, Canada, 1982-86

	Current provisions		Proposed provisions	
	Federal contribution	Farmers' contribution	Federal contribution	Farmers' contribution
	(Per cent)			
1982	4.0	2.0	4.0	2.0
1983	4.0	2.0	4.0	2.0
1984[2]	3.5	1.5	3.5	2.0
1985	3.5	1.5	3.5	2.0
1986	3.0	1.0	3.0	2.0

1 The contributions are calculated as percentages of farmers' gross revenues.
2 In 1984 the interest earned on the Western Grain Stabilization Fund was more than one-third of the federal and farmers' contributions (producer levies) for the two previous years; thus the contributions dropped to 3.5 and 1.5 per cent, respectively. If the same thing happens for the next two years, they will drop still further to 3.0 and 1.0 per cent, respectively, in 1986 (Section 16, Western Grain Stabilization Act).
SOURCE Jacques Jobin, *"L'instabilité des revenus agricoles dans les Prairies,"* Economic Council of Canada (forthcoming).

As it now stands, the contributions of both the federal government and farmers will be reduced by half a percentage point in 1984 and possibly another half a percentage point in 1986, as interest earned on the accumulated Stabilization Fund increases. To cover the extra costs of correcting the weaknesses of the Western Grain Stabilization Program, participating farmers should be prepared, as a minimum, to forgo the reduction in their percentage contribution. Common sense would seem to suggest that the federal contribution (subsidy) rate should diminish as the need for it diminishes, while farmers' contribution rates to their insurance plan should remain fixed. If farmers were to forgo the drop in contribution rates provided for, the rates in Table 7-10 would apply. Such a change would increase the Fund, thus allowing for improvements in the Stabilization Program. In turn, more farmers might be willing to participate in the Program.

Initiatives to Enhance Productivity and Canada's Competitive Position

Since we have concluded that the international outlook for the medium to long term is for declining real grain prices, it becomes doubly important to address the question of productivity. For even if real prices do trend downwards, output growth will still be profitable if productivity advances fast enough. The following initiatives, then, are proposed to enhance the productivity of the western grain industry.

Since both basic and applied research are fundamental to keeping the grain industry abreast of new varieties, new fertilizers, pesticides, machinery, and other intensive farming techniques, it is vital that this shortcoming in current research be remedied. And research information must be forthcoming about production potential and domestic and international market opportunities. Thus

16 We recommend that Canada augment its support to research in agriculture and improve the environment for the adoption and adaptation of both domestic and international technological advances.

Farmers not only require a demonstration of the application of new techniques and information, but they also need a market environment that will provide the incentive to change and to assume risks. The external market is subject to forces, many of which are beyond Canada's ability to influence, but the domestic climate is of our own making. The regulatory framework governing the grain industry contains many faults that impede adaptation and productivity advances. Although we are not advocating wholesale deregulation, because many regulations have useful purposes,

17 We recommend that selective deregulation and regulatory amendments be explored for the specific purpose of improving productivity in the agricultural sector.

Deregulation is not a panacea. A great deal could also be done within the existing regulatory framework – a framework to which we have avoided extensive reference up till now. The grain industry – indeed, the whole agricultural industry – is so interwoven with federal and provincial regulations, marketing boards, subsidies, and programs that anyone but an expert quickly becomes lost in the maze.[10] The Economic Council, in its extensive work on regulatory reform, identified many areas where quick action would be highly desirable. Attention is drawn to a few examples.

An extensive regulatory framework has evolved to accommodate the problems associated with unsustainably low rail rates under the old Crow freight rate. Chapter 10 of this report provides a description of the new legislation on freight rates and a critique of some of its shortcomings. Despite the major compromise incorporated in the legislation, whereby the Crow Benefit is to be paid to the railways rather than to grain producers (contrary to the recommendation of the Gilson Report), considerable room for manoeuvre has been provided.

Under the new Crow freight rate structure, the railways should be able to restore and upgrade the vital transportation network. Indeed, while transportation was the bottleneck in the 1970s and early 1980s, this problem is largely resolved or is in the process of being resolved. What must accompany that are modifications to the regulatory framework that derived – at least in part – from the inadequacies of the grain freight structure, which prevailed for so long. These modifications apply most importantly to the operations of the Canadian Wheat Board and the Canadian Grain Commission.

The grain quota system operated by the Canadian Wheat Board has major implications for farmers. Quotas are used to ration scarce handling and transportation capacity, and to assemble grain more efficiently for export. Unfortunately, however, quotas have tended to penalize specialization, continuous cropping, and highly productive land. Resolution of the Crow debate should alleviate the need for quotas on domestic feed grains and open-market grains. The changes in grain freight rates should be used as an opportunity to re-examine the mandate and administrative practices of the Canadian Wheat Board. Other measures could include: turning over to the Grains Transportation Authority full responsibility for quotas

on domestic feed grains; better information with respect to the initial and final prices for grains, so as to assist Prairie farmers in cash-flow management and resource allocation; the introduction of a payment schedule related to time of delivery and with some provision for storage costs; alterations in revenue pooling to reflect better the protein grading of wheat and to encourage producers to grow those crops yielding the protein level demanded by international buyers.

The Canadian Grain Commission plays a major role in regulating the western grain industry. Most importantly, it administers standards governing the export of Canadian grain. New varieties and the purity of export shipments are tested and regulated. The Commission also establishes tariffs for handling grain, as well as other regulations with respect to elevators, terminals, and cars loaded by producers. The activities of the Commission have a strong influence upon the competitive position of the grain industry and upon its incentive to adapt to new technology and changes in international demand. It is vital, therefore, that the Canadian Grain Commission be subject to review and possible modifications.

The western grain industry needs to make substantial productivity improvements in order to provide Prairie farmers with ways to respond to adverse circumstances that may develop in the future. And adverse conditions are what we expect – not disaster, but simply a continuation of the historic slide in the real price of grain – however gentle that might be. In the process, both prices and markets are likely to become increasingly volatile. The ability of Prairie grain farmers to increase production faster than the capacity of the domestic market to absorb it means that exports must expand. This, in turn, depends upon the ability of Prairie farmers to grow grain as efficiently as farmers elsewhere in the world.

Thus two policy dimensions must be addressed. We must try to cushion the volatility of international markets and the income consequences for the Prairie farmer. And we must try to increase the productivity of the Prairie farmer and his or her ability to earn a decent rate of return in the face of declining real prices for grain products. Both dimensions are critical to the future well-being of the Prairie farmer – a future that may well be rather stagnant compared with the heady days of the 1970s.

The Livestock and Meat Processing Industries

The livestock industry is a major component of western Canada's economy, with western livestock and poultry sales having amounted to over 2.8 billion dollars in 1982 (see Table 7-1). The industry accounted for 28 per cent of total farm cash receipts, with its importance ranging from 16 per cent in Saskatchewan to 40 per cent in Alberta. The livestock processing industry contributed more than $375 million in value added in 1980 and accounted for 3 per cent of all value added in western manufacturing. The industry provided over 12,000 jobs, making it the largest employer of all the Prairie manufacturing industries.

The livestock production and meat processing industry is complex, and it is impossible to demonstrate unequivocally how much it has contributed to western economic growth, because no clear-cut trends are discernible in the various components of the industry. Indeed, with the data that are currently available to us, we were unable to bring the output of the various components of the industry to a common denominator; so we shall discuss the components one by one.

All in all, the industry was a strong contributor to western economic growth during the 1962-72 decade, but it was much less so – perhaps even a net drag – during the 1972-82 period. Nevertheless, in the future it may once again contribute to the growth of the western provinces. The realization of this hope will require the industry to rise to the not-inconsiderable challenge of increasing its export penetration in the United States – particularly in the beef-deficient market of California – and in Japan, where the quality beef and pork markets promise attractive possibilities.

The complexity of the industry can best be illustrated in the case of beef. Western Canada produces a surplus of feed grain that can be used in various ways to create value added. The feed grain could be exported to other regions, to be fed to calves born outside western Canada; this could be called the "zero value-added scenario" for the western livestock and meat industry. In another case, calves born and weaned in the West could be shipped to, say, eastern Canada, to be fed there on grain exported from the West and then slaughtered and processed in the East; this would produce some value added in the West, but not much. Additional alternatives, in increasing order relative to value added, would be to: finish the cattle in the West and ship them East for slaughtering and processing; slaughter them in the West and ship the carcasses to the East for processing; break down the carcass into "prime cuts" and ship them "boxed" to the eastern market for final processing into retail cuts, convenience foods, and fast food products; or take all of these steps in the West and ship the final, consumption-ready product. The last alternative would maximize western value added and could be designated as "the 100 per cent value-added scenario."

At various times all of these options have been taken, though in different mixes over time. The mix depended on the relative transportation costs and on federal and provincial policies.

These options apply as well to pork, sheep, and poultry (chicken and turkey). Western livestock and meat are supplied to a variety of markets: the local western market; the market in eastern Canada, and the export market, which can be subdivided into the United States, Japan, and other markets. Each of these markets has different characteristics.

The Cattle and Beef Industry

In the local market the western beef industry has been more than able to fill the western demand. Meat consumption per capita grew relatively rapidly between 1960 and the mid-1970s (about 2.8 per cent annually), but it had a tendency to decline in the late 1970s and early 1980s (by 4.6 per cent annually). Total beef consumption in the West increased by 4.7 per cent from 1960 to 1976 and has declined by 2.4 per cent annually since then. This decline, combined with a reduction in the export of slaughter cattle to eastern Canada, has resulted in a situation where only 70 per cent of slaughtering and processing capacity is being utilized.

In assessing the likely future developments, we assume a 2 per cent annual population increase in the West, which is compatible with some interregional migration from the East to the West, a slightly higher fertility rate in the West than in the East, and net international migration at current rates. Depending on whether meat consumption levels per capita remain at the already-somewhat-depressed level of 1981 or gradually increase by 1997 to the 1981 level in the United States (which was roughly 16 per cent above the level in Canada that year), the western local market for beef would increase by 2 to 3 per cent yearly. This would be a weaker performance than that of that of the 1960-76 period, but better than the one since 1976.

For the eastern market, little beef has moved from the West to central or eastern Canada in final product form; therefore, we concentrate our discussion on the four dominant forms of beef and beef product exports – namely, weaned calves shipped live; cattle fed to slaughter time and shipped live; slaughtered cattle shipped in carcass form for final processing; and carcasses broken into "prime cuts" and shipped in "boxed" form. The mix of these four exports has changed over time. Between 1962 and 1972 both feeder and slaughter cattle exports increased rapidly. Between 1972 and 1982, however, the former slowed down somewhat, although a respectable 4.4 per cent annual growth rate was still achieved; the latter went into a sharp decline, causing considerable concern among western cattlemen and meat packers. The West lost a substantial amount of potential value added because of the change.

Two factors – federal transportation policies and provincial government actions – caused this reversal. The transportation policies, the fixed statutory grain freight rate (the Crow Rate), and the Feed Freight Assistance Program, in combination with the freight rate for meat, which increased by 150 per cent between 1974 and 1983, reduced the competitive advantage of western cattle finishing, slaughtering, and meat processing to a significant degree. At the same time, eastern provincial governments – especially that of Quebec – made determined efforts to subsidize provincial self-sufficiency. While these efforts were most successful in the pork industry, their effect on raising the value added for the eastern provinces at the expense of the western ones was not negligible in the case of beef either.

The recent reform of the Crow Rate will continue to counteract the West's comparative advantage in cattle production, unless the statutory renegotiation after 1986 changes the method of transportation subsidy payments. Now it is in the interest of the railways to ship as much subsidized feed grain out of the West as possible, thereby depriving western cattlemen of cheap feed. Furthermore, the fall in cattle shipments has resulted in a reduction and deterioration of railway cattlecars.

One comparative advantage for the West is the relatively more plentiful grazing land in the western provinces than in Quebec. Therefore Quebec's self-sufficiency in feeder calves should be relatively expensive, compared with purchasing them from the West. This would be a "low value-added" export for the West, but Quebec could always obtain feeder calves from the United States. Therefore, the Saskatchewan and Manitoba policies to discourage the export of calves will probably be self-defeating in the long run. Ontario has been, on the whole, self-sufficient, both in cattle and cattle feed, and offers no hope of improvement in western exports.

Among the higher value-added exports to the eastern market, boxed beef shipments are expected to show the highest growth rate. A major expansion of cattle and beef exports to the central and eastern Canadian market is unlikely, however.

The United States is a traditional market for the cattle and beef exports of the Canadian West. Nevertheless, the market is very unstable and very competitive, with wide fluctuations in price and volume. The traditional U.S. markets for western Canadian beef exports have been the north-central states. Recently exports to the west coast have made

strong gains. Most of the cattle moving to the United States are slaughter cattle. This is a convenient form of export, even though it contains relatively less value added than beef. Live cattle are subject to a low tariff; they can be packed and graded in the United States as a U.S. product; they risk no consumer resistance; and they encounter little lobbying. In addition, there have been major downward wage renegotiations in the U.S. slaughtering industry recently, so that Canadian slaughtering would not be competitive.

One important factor that may currently favour increased exports to the United States is the growing deficiency of beef in California. This opportunity could be exploited because of the favourable freight rate from Calgary to San Francisco. This freight rate advantage depends to some degree on the large northbound movement of vegetables, which creates a considerable backhaul potential.

California offers a sizable potential market. In 1979 the total California beef requirement was 3.4 billion pounds, of which 1.9 billion pounds had to be imported. Total Canadian beef production that year amounted to 2.0 billion pounds, and Alberta – the most likely supplier of California – produced 0.85 billion pounds. If 10 per cent of the California deficit could be filled by Alberta, production would increase by 22 per cent in that province. The California deficit is likely to grow in the future because of the recent increase in grain freight rates into the state and because of the growing shortage of water, which leads to the diversion of irrigation from forage to higher-valued vegetable crops. While Alberta's water supply is also becoming increasingly scarce (see Chapter 9), the situation is far from being as strained as in California. Thus the Alberta cattle industry is developing a competitive advantage over that of the United States.

The same holds true in the Washington and Oregon markets. Live beef is the most likely form of export, because carcass beef is subject to higher tariff; it must be labeled as a Canadian product; it could encounter consumer resistance; and it could be subject to hostile lobbying by the U.S. slaughtering and meat processing industry. The U.S. government could erect substantial nontariff barriers by strictly and leisurely enforcing inspection of the imported goods at the border and even inspecting the Canadian plants. Nevertheless, gaining access to even a small percentage of the U.S. west coast market could lead to very considerable expansion of cattle output in Canada, especially in Alberta.

Offering the potential for beef exports to Japan is the fact that Japanese meat consumption is far below the level that one would expect in an industrialized country. For instance, the gross domestic product per capita in Japan was 82 per cent of that in Canada in 1981, while consumption per capita in Japan was only 33 per cent of the level in Canada. This is due partly to cultural differences but also to Japanese government policies. Concerns about food self-sufficiency, the need to import industrial raw materials and fuels, and the wish to favour the Japanese agricultural voter (a mainstay of the ruling political party) have resulted in a 25 per cent tariff on beef and in quotas on beef imports. Grass-fed beef from Australia accounts for 75 per cent of Japanese imports, followed by 20 per cent from the United States and 3 per cent from New Zealand. Apparently Canadian beef products cannot compete with Australian beef in the mass market. In the high-price market, Canada is competitive though; western Canada supplied 1 per cent of the Japanese beef imports in 1982, amounting to 1,432 tonnes. The Japanese prefer heavier, well-marbled beef, which would not qualify for the highest grades (A-1 or A-2) by Canadian classification standards. As there is no organized production specifically for the Japanese market, Canadians would produce to Japanese taste only by accident. The U.S. grading system's premium grades require a heavier and fatter animal than does the Canadian system; therefore U.S. exporters find it easier to cater to Japanese tastes.

In the future, there is likely to be some gradual relaxation of Japanese meat import restrictions. Assuming a static Japanese population and an increase of five kilograms per capita in beef imports between 1982 and 1997, that Canada holds its traditional 1 per cent share of the market, and that western Canada retains its 1982 share of Canadian beef exports to Japan, we foresee an increase of 1.9 million kilograms in beef exports to Japan between 1982 and 1997 – equivalent to a growth rate in exports to Japan of 5.9 per cent annually. This could be regarded as the lower-bound projection. At the upper bound, we might consider Canada gaining the total increase in the high-quality (top 20 per cent) market, with western Canada still retaining its 1982 share of exports to Japan. This would increase beef exports to Japan by about 37.8 million kilograms – equivalent to 24.9 per cent annually.

The "lower-bound scenario" plus the "low-forecast local demand increase" would account for 18 per cent of the current cattle slaughter in the West; the "upper-bound" one plus "high-forecast local demand increase," for 35 per cent. At present there is a 30 per cent surplus capacity in western slaughtering facilities. The "lower bound plus low local scenario" would, by itself, not suffice to use this surplus before 1997. The "upper bound plus high

local scenario" would necessitate investment in facilities by about 1992.

There are formidable barriers to western exports in other markets. In the low-income countries of the Pacific Rim we are not competitive with grass-fed, low-cost Australian beef. The protectionist policies of the European Economic Community and the lower transportation costs from eastern Canada preclude western exports to Europe. The only noteworthy exports are the occasional shipments of breeding stock to various parts of the world. These sales and the occasional meat product exports are minor "one-shot" deals, which are of marginal importance to the industry.

The Hog and Pork Industry

In general, the main features of the cattle and beef industry also hold for the hog and pork industry, only more so. In the local market the industry has been able to fill western demand. The number of hogs on farms rose rapidly between 1962 and 1972, at 6.2 per cent annually, but declined in the 1972-82 period by 1.2 per cent annually. Western hog slaughtering showed a similar change in trend.

The most spectacular change affecting the western livestock and meat industry occurred in the eastern market. In 1962 western Canada accounted for 44 per cent of all the hogs slaughtered in Canada; Alberta alone, 22 per cent. By 1982 the western percentage had fallen to 27 per cent; Alberta's, to 12 per cent. During the same period, the pork slaughter in Quebec increased from 18 per cent of the national total to 37 per cent. The loss to the West was made even harder by the fact that, unlike beef, pork was exported in highly processed forms. Hams, packaged bacon, cured sausage, and similar products contain much more value added than do live animals or carcasses.

This change was wrought partly by the feed grain freight subsidy and the statutory freight rates on grain during a period of inflation and partly by the creation, with the help of the provincial government, of a modern, efficient, and vertically integrated hog feed, production, and marketing system in Quebec. Quebec is now self-sufficient in pork; it exports products into the Maritimes; and it may export into Manitoba. Having accomplished so much, it seems unlikely that the Quebec government would allow the industry to contract. Ontario is also largely self-sufficient. Thus the markets of central and eastern Canada will not be a major source of growth for the western hog and pork industry.

Traditionally the United States has provided a small market for Canadian hogs and pork. Hog exports to the United States represented only about 4 per cent of the western slaughter in 1982. Pork exports were also minor. The absence of major slaughtering plants in the West is a handicap to an industry in which economies of scale are important. In the United States the 34 biggest plants slaughtered an average of 1.4 million hogs each in 1982. The 101 biggest plants averaged 750,000 hogs each and accounted for 90 per cent of all the hogs slaughtered in the United States. The average Alberta plant slaughters 375,000 hogs per year. The existing surplus capacity in western facilities makes investment in newer, larger, and more efficient plants unlikely. Also, recently renegotiated U.S. labour contracts have reduced hourly wages in the hog-slaughtering industry by 39 per cent. Only recently have similar reductions occurred in Canada to meet the competition. Taking all these factors into consideration, we believe that substantial growth in hog and pork exports to the United States will be difficult to achieve.

By contrast, Japan has become an important export market for western pork in recent years, matching the U.S. market in size. But it is a difficult market. In order to exploit the Japanese market it would be necessary to gear Canadian export-oriented production to Japanese preferences – that is, to produce pork to different standards. This carries considerable risks, but the vertically integrated Quebec industry has been following such a policy successfully.

The Japanese are very reluctant to become dependent on any single supplier, however. In normal times, Canada, the United States, and Denmark each supply about 25 per cent of Japan's pork imports, with other countries supplying the remainder. Being price-competitive is very important. The Japanese tariff on pork is lower than the one on beef – 6.9 per cent as opposed to 25 per cent – but there are nontariff barriers at the government's disposal, such as the de facto embargo on pork imports in late 1979.

We assume, as in the case of beef exports, that Japan's population will remain stable, that annual pork consumption per capita will increase by five kilograms between 1982 and 1997, that Canada will retain its current share of the market, and that western Canada will maintain its 1982 share of Canadian exports to Japan. In this case, Canadian pork exports would increase by 19 million kilograms over the 15-year period, resulting in a very respectable growth rate of 9.0 per cent per annum.

The Sheep Industry

This is a minor industry. Lamb accounted for less than 1 per cent of Canada's meat consumption in 1981, compared with 2 per cent in 1960. Imports

provide for 60 per cent of domestic requirements. The main problem in the western sheep industry is the high production costs. The industry is relatively labour-intensive. Flocks on marginal grazing land are exposed to predators – chiefly coyotes. If not guarded continuously, the flocks suffer large losses, thus raising production costs. Western sheep slaughter declined by almost 70 per cent between 1962 and 1982, which contributed to further cost increases through the loss of economies of scale. Low-cost producers like Australia and New Zealand have few predators, abundant forage, lower labour costs, and large economies of scale; thus they have a strong competitive advantage over the western sheep industry. It is not likely that this industry will contribute significantly to future economic growth in the West.

The Poultry Industry

The poultry industry is characterized by government policies aimed at providing a reasonable and stable income for poultry farmers. This is achieved by supply management – that is, by restricting output below that which would prevail under the absence of a supply-management policy. In order to achieve this, each province is allotted a basic production quota based on the pre-quota, five-year average production. Overbase allocation is supposedly set according to a variety of criteria, none of which is followed consistently. The quota policy provides the farmers with a higher income but also increases the price the consumer has to pay. In practice, such policies restrict each province's output growth to its approximate population growth, irrespective of efficiency or production costs. Also, they render the Canadian poultry industry permanently unable to compete in the United States or the world market.

Thus future growth in the western poultry industry will be restricted to population growth, unless the industry succeeds in enlarging its local market by reducing its production costs and price sufficiently to divert the consumer's dollar from other goods and services to increased poultry consumption. With such a diversion, competing meat products are more likely to be the losing commodities than, say, carpets or home computers. Therefore, under the present institutional arrangements there would be no net gain to western Canada's economic growth from increased poultry output.

Export Markets and the Problem of "Vertical Segmentation"

The chances for expansion of western livestock and meat product sales in the home market and in central and eastern Canada are limited. The best growth possibilities are in the U.S. and Japanese export markets for beef and pork. These markets have problems and offer opportunities different from those in Canada, and at least a partial restructuring of the industry is required. The problem is set out in a clear and concise fashion in the research done for the Council.[11]

Canadian livestock production and trade are conducted within a structure that is compatible with the domestic and traditional trading markets. The structure of the industry is, for want of a better term, "vertically segmented." There are markets operating, for example, between purebred breeders and cow/calf operators, between cow/calf operators and backgrounders, backgrounders and feedlots, feedlots and packing plants, packing plants and processors. Each of these markets is active almost on a daily basis. Prices change with great volatility at all levels. This market structure presented few problems when trade was conducted largely in either live animals or carcasses and when the only significant export market was the United States, which had similar tastes and a similar market structure. Thus products destined for either the domestic or foreign market could be treated as a common commodity. Livestock producers could supply a product without concern for the eventual market. Any differences in specification that did arise could be handled at the final stage of processing in the importing country.

Exporting products offshore or exporting those with a greater degree of value added presents problems for the current market structure. The Japanese trade, for example, requires an entirely different product than does the Canadian market. In the case of beef cattle, the animals needed for the Japanese trade do not meet the specifications of the Canadian grades A-1 and A-2, which receive a price premium. As the feedlot operator sells into an auction or near-auction-type system, he has no knowledge of what market – Canadian or Japanese – he is selling to. Thus he will produce cattle to meet the requirements that will secure the domestic premium. The packer who receives an order from the Japanese must rely on what are essentially "mistakes" by the cattle feeder to fill his orders.

At present, there is no price mechanism to inform the producer that a product for a Japanese order is required. The packer might personally contact a feedlot about its requirements in advance, but few feedlot operators would be willing to commit resources to producing such cattle when, over the interim period, domestic prices could improve, and his prior commitment would lead to forgone profits. This problem can work its way back through the system. Alternative breeds of cattle may be better suited to production for the Japanese market. Unfortunately, since feedlots do not know the market

destination of their product, they will not buy such calves; thus cow/calf operators will not produce them nor will purebred breeders develop these strains. Over time, specifications between the United States and Canada have diverged, so a similar problem arises.

Furthermore, as export trades take somewhat longer to arrange, planning becomes virtually impossible for the packer. Accepting an export contract locks the seller into a specific price. If the domestic market price increases during the interval between acceptance of the order and the actual requirement of animals to fill the order, foreign contracts will be unprofitable for the packer. The possibility of unprofitable contracts implies that the importer cannot be guaranteed security of supply; therefore, long-term market development becomes very difficult.

The more processed the product is, the more exact the specifications become and, of course, the longer the lead time required. Again, changing packer or processor supply prices, based on domestic market conditions, makes the guarantee of a profitable foreign transaction very difficult. If western Canada tries to expand both its export markets and the value-added component of those exports, these problems will become more prevalent.

Vertical integration of the industry, or the part of it that supplies the foreign market, may generally reduce these problems. The firm could look at the profitability of a foreign sale in its entirety. The feeding component of the business could be assured a market for products produced specifically for the foreign market, while the processing operation could count on a price for inputs. All such transactions would only be internal accounting transactions and not subject to open market forces. Clearly, considerable risk is involved in getting firms to integrate for the purpose of supplying specialized products when no continuing markets yet exist. But not integrating makes it very difficult to develop those markets.

Vertical integration may come about by the spontaneous reaction of the firms in the western livestock and meat industry to the stimulus of market forces. Government could help by organizing and disseminating information. There is some evidence that vertical integration could provide the means to success on the international market. The vertically integrated hog industry in Quebec has been raising heavier hogs for the Japanese market. In western Canada, the provincial beef stabilization programs in Saskatchewan and Manitoba are encouraging vertical integration in the producing sector. Some further integration could be explored. A common export agency might help to overcome these problems. This might be a role for the newly established Canagrex.

Some observers of the Canadian agricultural scene have expressed concern that foreign importers of Canadian meat may exploit interprovincial competition for export markets so as to reduce the price of our exports. Unfortunately there seems to be little opportunity to keep our export prices high by a unified export policy. International competition is very keen, and Japan in particular is making strong efforts to play the various countries from which it imports against each other. Any concerted action by Canadian suppliers would therefore create a serious risk that Japanese orders will go to other countries.

Conclusions and Recommendations

Projected growth of the local market and of accessible markets in central and eastern Canada suggests that the current productive capacity will be sufficient until at least 1992, and possibly longer. With modest success in the California and Japanese markets, new investment will be needed as early as the late 1980s.

There is a great shortage of information on, and an even greater one of research into, export markets. Therefore,

18 We recommend that product-specific market research be conducted on the California market for western meat products. The focus should be on evaluating particular markets from both an economic and a political perspective.

The Japanese market has attractive growth possibilities; yet it differs in many important respects from the North American market. In a segmented industry, individual firms find it too difficult and costly to acquire the necessary knowledge and contacts. Therefore,

19 We recommend that considerably more effort be made by the federal government, western provincial governments, product marketing agencies, and, if possible, private industry to establish contacts and become familiar with the Japanese meat products market. A special effort should be made to ensure that Canadian processors are informed and educated about Japanese methods and requirements. The objective is to have the industry ready to take advantage of any relaxation in Japanese import policies.

Even if firms are fully aware of opportunities in the Japanese market, the present vertically segmented structure of the industry may render any attempt at full exploitation of the future growth in exports to Japan too risky for individual firms. As a result,

20 We recommend that preferably the livestock and meat-processing industry (but if necessary the federal government) conduct research into the question, "Is the structure of the western livestock and meat industry suitable for trade in

current and expected international markets?" If problems are identified, alternative structures should be proposed and, if possible, promoted.

The western agriculture industry is both large and important, particularly for the Prairie provinces. Given the international market trends, however, and the rising costs of inputs, it is unlikely that the industry as a whole will be able to contribute as much to future growth in incomes per capita and the population as it did to past growth. That makes measures such as those we have recommended, to improve the productivity and marketing performance of the agriculture sector and to stabilize further the incomes of farmers, even more important than they would otherwise be.

8 Three Growth Industries: Potash, Uranium, and Coal

The potash, uranium, and coal industries have grown rapidly in the last 20 years and have become very much more significant to the western economies than in the past. How much they can be expected to contribute to future western growth is the central concern of this chapter. We consider in particular whether rapid growth in these minerals can be expected to resume after the recession at the same rate as, or faster than, in the 1970s or whether some slowdown in that growth rate is more likely. We also propose policies to speed up the growth rate.

Large, relatively low-cost reserves[1] of all three of these minerals are concentrated in the West, and the prospects for growth of demand in current and potential markets in North America and in the rest of the world still seem good. Potash reserves in Saskatchewan, for example, are the cheapest and most extensive in the world, and practical substitutes do not exist for this necessary constituent of crop fertilizer. Many observers are optimistic that the expanding world population and more cultivation in developing nations will bring improved market conditions. Optimism about the potential for the coal and uranium industries is based on their perceived importance in energy trade as substitutes for oil. Other inputs required for mineral production, such as skilled labour, water resources, and specialized infrastructure, are also available in the West. All these factors create a feeling of confidence about the long term.

Growth constraints exist, however. Some of these are beyond the control of the West; others are a function of the institutional environment or other factors over which there is some control. We consider both kinds of constraints and, where possible, prescribe remedies.

We recognize very early in the discussion that not one of these minerals has yet contributed as much to the West as oil and gas, the forests, or agriculture. But given the prospects of slower growth in these traditional resources, it is reasonable to ask if future prospects for these other resources are bright enough to compensate for this. We have structured our analysis around the prospect of change in each of the three basic determinants of growth for each mineral – that is, in prices, economic reserves, and productivity – and the extent to which any such changes could be influenced to the advantage of the West.

We begin by reviewing the recent history of the development of each mineral industry in the West. After that, we look at the structure of the mineral markets for coal, uranium, and potash; we consider future prospects; and we examine the role of policy to improve them. Our most important findings concern the effects on growth potential of using or not using market power. Also addressed are policies for improving efficiency with respect to resource taxes and domestic pricing.

Mineral Industry Activity

The growth in the coal, uranium, and potash industries can be linked to the expansion of markets for the West's minerals, both within Canada and elsewhere, and to increased prices. All of these industries benefited from the commodity boom of the 1970s and from the rising energy prices associated with OPEC.

Growth in coal production has occurred for two reasons. First, western metallurgical coal found a market in the fast-growing steel industry in Japan in the early 1970s. Second, the demand for coal for use in domestic electricity generation in the West grew in the 1970s as the western economies and population grew in response to the oil boom. Coal was the cheapest substitute for oil and gas in thermal electricity generation, and this led to its adoption in both Saskatchewan and Alberta.

Most of the thermal coal in the plains region of those provinces has too low an energy content relative to its volume to make it competitive in other markets once transport charges are taken into account. But moderate quantities of higher quality thermal coal from the foothills and mountains in both Alberta and British Columbia were shipped overseas and to other provinces as other fuels were being substituted for oil the world over. When Japan doubled its steel-making facilities in the 1970s, Alberta and particularly British Columbia benefited from the expanded export market for metallurgical coal.

The uranium industry in Saskatchewan has also benefited from increasing oil prices. The move to nuclear energy has meant a greater demand for

Table 8-1

Sales of Minerals in Western Canada, 1962-82

	Saskatchewan minerals						Coal					
							Alberta				British Columbia	
	Potash (K_2O)		Uranium (U)[1]		Lignite coal		Subbituminous		Bituminous		Bituminous	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value
	(Thousands of tonnes)	($ Thousands)	(Tonnes)	($ Thousands)	(Thousands of tonnes)	($ Thousands)	(Thousands of tonnes)	($ Thousands)	(Thousands of tonnes)	($ Thousands)	(Thousands of tonnes)	($ Thousands)
1962	73	3,000	1,559	39,895	2,047	4,554	..	..	..	..	749	6,134
1963	569	22,500	1,519	37,223	1,700	3,714	..	..	..	..	772	6,238
1964	778	31,162	908	21,195	1,828	3,905	..	..	..	..	827	6,328
1965	1,353	55,971	692	14,980	1,915	3,730	..	..	..	..	863	6,714
1966	1,805	62,665	649	12,943	1,890	3,727	..	..	..	..	772	6,196
1967	2,162	67,395	771	10,017	1,814	3,621	2,412	..	845	..	824	7,045
1968	2,647	65,121	770	12,250	2,042	4,137	2,689	..	852	..	870	7,589
1969	3,168	69,383	601	10,936	1,831	3,727	2,893	..	911	..	773	6,817
1970	3,052	108,695	601	10,723	3,464	7,400	3,553	..	2,214	..	2,399	19,560
1971	3,606	145,966	463	8,430	2,996	6,405	4,008	7,000	3,196	..	4,141	45,802
1972	3,703	146,014	513	9,342	2,977	6,569	4,455	10,205	3,401	38,613	5,467	66,030
1973	4,788	195,025	539	9,810	3,656	8,500	4,480	11,349	4,062	49,500	6,925	87,976
1974	5,730	311,621	428	14,477	3,485	8,161	5,080	13,232	3,335	71,421	7,757	154,594
1975	4,678	348,494	551	15,733	3,549	9,239	5,980	17,687	4,146	162,357	8,925	317,112
1976	5,169	358,399	1,424	44,769	4,694	15,201	6,322	20,004	4,768	214,657	7,538	296,684
1977	5,700	398,055	1,825	74,984	5,476	20,335	7,670	23,611	4,253	192,382	8,424	328,847
1978	6,453	495,718	3,794	261,462	5,029	17,705	8,246	30,555	5,194	216,233	9,464	381,895
1979	7,147	733,346	2,760	257,963	5,012	20,475	9,407	44,723	5,139	202,280	10,570	439,280
1980	7,131	1,009,754	2,352	232,206	5,980	29,726	10,426	56,761	7,448	310,318	10,824	461,493
1981	6,364	997,531	2,648	258,302	6,798	42,061	11,221	69,993	6,729	411,837	11,753	554,271
1982	5,090	642,866	2,725	250,526	7,494	62,449	..	..	..	..	10,646	556,878

1 From 1962 to 1974, uranium figures pertain to production rather than sales.

SOURCE Saskatchewan Department of Energy and Mines, *Mineral Statistics Yearbook*, various years; and Brenda J. Dyack, "Western Canada's Coal Industry: Status and Potential," Economic Council of Canada (forthcoming).

uranium to fuel reactors. The large U.S. market and the growing French, West German, and Japanese markets have been important to Canadian producers of uranium. Growth in the demand for uranium had been expected for a decade before the oil crisis of the early 1970s made it a reality. The industry in Saskatchewan languished after the early 1960s when the United States (the only market) phased out the importation of Canadian uranium for its strategic arms stockpile. Canadian federal government subsidies, through stockpiling programs, kept the industry functioning at a much reduced level during the 1960s. From 1965 to 1974, Eldorado Nuclear (a federal Crown corporation) was the only producer in Saskatchewan. Only in 1977 did uranium production in Saskatchewan exceed its earlier peak in 1958.

Production from Saskatchewan potash reserves began in 1962, although the extensive reserves of potash in the province had been discovered much earlier in the course of oil exploration. Capacity expanded quickly as the new mines started up and Saskatchewan potash entered the North American market for fertilizer products. Marketing and policy issues have been important in determining the level of production and its value throughout the two decades since production began.

Table 8-1 summarizes the increased volume and the growth in the value of sales for the three minerals. The start of rapid growth in export demand for the metallurgical and thermal coal produced in Alberta and British Columbia became evident with the discrete jumps in the production of bituminous coal between 1969 and 1971. Initially, most of the exported coal was metallurgical coal; but more recently thermal coal exports have increased, although they still represent a smaller proportion of total coal exports, particularly in British Columbia. Some western subbituminous, and larger volumes of bituminous, coal are also shipped eastward to thermal plants in other provinces, but the highest volumes go overseas, mainly to Japan. The remaining growth in the production of coal in Saskatchewan and Alberta is attributable to the growth of electricity demand in those expanding economies. Both provinces are committed to basing their electricity generation on coal-fired plants, with only a small proportion being hydro-generated.

The flat period of production for uranium in the 1960s and the growth in potash in Saskatchewan are also evident from the table. By the early 1980s, uranium production was roughly five times that of the early 1970s; potash production was almost double. Production of lignite coal, which has been used domestically with some exports to Ontario and Manitoba, roughly doubled also. Subbituminous coal production almost tripled in Alberta, reflecting the higher growth in electricity demand in that province

Table 8-2

Value Added[1] as a Proportion of Gross Domestic Product, Selected Goods-Producing Industries, Western Canada, 1970-81

	Canada			Saskatchewan			Alberta			British Columbia		
	Agriculture	Mining[2]	Manufacturing	Agriculture	Mining[2]	Manufacturing	Agriculture	Mining[2]	Manufacturing	Agriculture	Mining[2]	Manufacturing
	(Per cent)											
1970	3.3	4.4	24.7	20.0	10.8	6.8	7.5	17.7	10.0	1.5	3.5	18.2
1971	2.7	4.0	24.4	21.1	10.0	6.2	5.5	18.7	9.9	1.0	3.1	18.6
1972	2.7	4.0	24.4	16.1	9.8	7.0	6.1	19.9	9.8	1.1	3.3	19.3
1973	3.7	5.0	24.5	25.5	9.1	7.0	7.8	22.5	9.3	1.3	5.3	20.5
1974	3.8	5.9	25.0	29.1	10.7	6.2	7.2	26.8	8.7	1.2	4.6	19.7
1975	3.6	5.8	23.0	25.8	10.6	6.4	6.3	28.5	8.7	1.1	4.1	17.8
1976	3.0	5.8	21.8	22.4	9.9	5.9	5.1	29.7	8.5	1.1	4.5	18.1
1977	2.6	6.2	21.9	17.1	11.8	5.8	3.9	32.0	9.3	1.1	4.3	18.2
1978	2.9	6.3	22.9	17.9	13.4	5.9	4.8	31.8	8.9	1.2	4.2	19.7
1979	2.9	7.3	23.6	16.0	14.3	6.3	5.0	33.0	8.7	1.3	5.8	19.7
1980	..	7.6	22.9	..	14.7	6.2	..	32.6	8.1	..	4.8	18.1
1981	..	6.6	22.3	..	14.5	5.6	..	29.9	8.6	..	3.8	15.9

1 The value added data in this table have not been adjusted to take into account the taxes and subsidies paid by, or to, the industries. For a discussion of possible biases, see Lawrence Copithorne, *Natural Resources and Regional Disparities*, Economic Council of Canada (Ottawa: Supply and Services Canada, 1979), p. 193.

2 Including oil and gas.

SOURCE Based on data from Statistics Canada.

and also the larger shipments to other provinces of this higher-valued coal. Bituminous coal production also grew very rapidly in both Alberta and British Columbia. The growth in activity for B.C. coal was in turn based on growth in the coal export markets.

The increased production volume of these minerals is only one aspect of growth. Value added, determined partly by prices and partly by the degree of processing, is a better measure of the overall contribution to the economy than is the sheer volume of output. A review of value added for the entire mining industry shows that mining is relatively more important in the West than in Canada as a whole and that its relative importance grew throughout the 1970s (Tables 8-2 and 8-3). Nevertheless, it remains of

Table 8-3

Value Added for Total Activity in the Mineral Industry as a Proportion of the Provincial Mining Total, Western Canada, 1970-81

	Saskatchewan			Saskatchewan and Alberta	Alberta	British Columbia	
	Potash	Uranium	Oil and gas	Coal	Oil and gas	Coal	Oil and gas
				(Per cent)			
1970	26.9	..	59.9	1.6	97.8	1.8	28.8
1971	30.9	..	61.1	1.8	97.5	7.2	30.7
1972	31.5	..	58.7	2.0	97.3	11.5	27.6
1973	30.0	..	59.3	1.9	97.7	8.2	14.9
1974	34.7	..	58.3	1.6	97.9	15.0	21.8
1975	39.7	..	53.4	2.6	96.8	34.6	25.6
1976	33.5	..	52.6	2.5	97.1	22.9	43.6
1977	30.4	..	55.1	1.7	98.0	25.1	37.5
1978	28.0	18.3	50.2	1.8	97.9	24.9	36.0
1979	39.2	14.4	42.7	1.4	98.4	19.5	27.1
1980	46.2	10.2	40.0	1.5	98.3	15.3	29.3
1981	39.7	20.7	36.0	1.3	98.5	20.7	37.9

SOURCE Based on data from Statistics Canada.

Table 8-4

Value Added per Capita in the Mining Industry, Western Provinces, Canada, 1970-81

	All mining				Oil and gas				Coal			Potash	
	Saskatchewan	Alberta	British Columbia	Canada	Saskatchewan	Alberta	British Columbia	Canada	Plains	British Columbia	Canada	Saskatchewan	Canada
						(Current dollars)							
1970	346	794	149	180	207	777	43	73	10	3	3	93	4
1971	377	913	145	177	230	890	45	83	13	10	5	117	5
1972	390	1,084	172	197	229	1,055	48	96	17	20	6	123	5
1973	475	1,509	336	285	281	1,474	50	131	22	27	8	143	6
1974	745	2,447	334	399	434	2,396	73	211	31	50	12	259	10
1975	829	3,016	325	430	442	2,920	83	257	59	112	21	329	13
1976	850	3,448	411	494	447	3,348	179	307	64	94	21	285	11
1977	1,060	4,099	433	569	584	4,018	162	374	52	108	22	322	13
1978	1,363	4,594	466	638	684	4,500	168	429	64	116	24	382	15
1979	1,647	5,586	738	837	703	5,494	203	529	61	144	28	645	26
1980	2,033	6,415	672	967	814	6,304	194	620	75	103	26	939	37
1981	2,313	6,528	593	959	833	6,432	225	654	67	123	28	919	37

SOURCE Based on data from Statistics Canada.

minor importance in British Columbia and Manitoba. In Saskatchewan, however, mining is just about as important as agriculture, and in Alberta it is of very great importance. Compared with oil and gas, other minerals are of minor importance; thus, even in the unlikely case of further extremely rapid growth, it would be difficult to envision these three minerals as being major growth generators (Table 8-4). That is not to say that improvements in growth are not likely for they are both desirable and possible. Rather, these minerals seem quite unlikely to play more than a small supplementary role in western economic growth.

The key point in Table 8-5, showing government revenues from minerals, is that coal and uranium make a negligible contribution to government resource revenues; potash makes a much more significant one. Indeed, in Saskatchewan, potash has sometimes been very important, with its revenues having reached a peak of 62 per cent of all resource revenues in 1975. This was a dramatic increase, considering that no potash was produced before 1962 and that its share of provincial revenues in 1970 was only 8 per cent. In contrast, the petroleum and natural gas share was 85 per cent. The low potash revenue in 1982 reflected the depressed conditions of that year. In Alberta, oil and gas have naturally dominated provincial mineral revenues; they provided 97 per cent of the revenues from 1973 to 1982. Coal's contribution to natural resource revenues in both Saskatchewan and Alberta is less than 1 per cent. In British Columbia only one of the three minerals – namely, coal – yielded any revenues; however, its share of the resource revenues amounted to only 18 per cent of the total in 1982. Of all the western provinces, British Columbia has accounted for the highest share of coal revenues.[2]

The increasing unit value of the West's minerals has contributed to their increased relative importance in the West, as have the larger volumes that have been produced, particularly since 1970. An index of the average value of sales is used as an indicator of the rising price of minerals in Table 8-6. Price increases were greatest for imported oil and for domestic oil, but price gains were also significant for uranium and coal, having risen much faster than the consumer price index during the 1970s and early 1980s. Potash prices remained roughly stable in real terms, having increased just a little faster than the consumer price index in nominal terms.

Table 8-5

Provincial Revenue from Selected Minerals, Western Canada, 1970, 1974, and 1982

	1970	1974	1982[1]	1970	1974	1982
		($ Millions)			(Per cent)	
Saskatchewan						
Oil and gas	29.3	55.7	776.5	85.1	60.0	86.2
Potash[2]	2.7	34.6	80.6	7.7	37.3	8.9
Coal	0.2	0.6	8.5	0.5	0.6	0.9
Uranium	..	..	28.5	..	..	3.2
All minerals	34.4	92.8	901.3	100.0	100.0	100.0
Alberta						
Oil and gas	..	505.3	4,784.0	..	87.4	95.4
Coal	..	4.2	16.3	..	0.7	0.3
All minerals	..	578.4	5,016.2	100.0	100.0	100.0
British Columbia[3]						
Oil and gas	..	48.6	76.2	..	73.9	77.4
Coal	..	3.7	17.3	..	5.6	17.5
All minerals	..	65.8	98.4	100.0	100.0	100.0

1 Alberta data are for fiscal year 1981/82.
2 1982 was a particularly bad year for potash, while 1981 revenues amounted to $264.7 million - 34 per cent of total revenues.
3 Revenues collected under the Mining Tax Act (a profits tax) in British Columbia are not included here; they are very small.
SOURCE Saskatchewan Department of Energy and Mines, *Mineral Statistics Yearbook*, various years; Alberta Department of Economic Development, *Alberta Industry and Resources*, 1982; and B.C. Ministry of Energy, Mines and Petroleum Resources, *Annual Report*, 1979, as well as personal communication with the Ministry.

Table 8-6

Selected Price Indexes, Canada, 1962-82

	Mfr's selling price	CPI	Imported oil price	Average wellhead price of oil	Saskatchewan minerals[1]			Coal[1]		
								Alberta		British Columbia
					Potash	Uranium	Lignite	Subbituminous	Bituminous	Bituminous
	(1971 = 100)									
1962	83.3	75.8	102.8	81.2	101.5	140.5	109.9	..	..	74.0
1967	90.4	86.5	94.1	89.4	77.0	71.4	99.0	..	..	77.3
1972	104.4	104.8	110.8	100.8	97.4	100.0	109.4	131.6	103.2	109.2
1977	174.3	160.8	646.3	367.1	172.6	225.6	183.7	177.0	411.2	353.0
1982[2]	288.8	262.5	1,839.3	896.1	312.2	519.4	412.4	358.6	556.4	473.0
	(Per cent)									
Rate of change										
1962-72	25.3	38.3	7.8	24.2	-4.1	-28.8	-0.5	..	..	47.5
1972-82[2]	176.6	150.5	1,560.0	789.1	220.5	419.4	276.9	172.5	439.1	333.0
1962-82	246.7	246.3	1,689.2	1,004.1	207.5	269.6	275.2	..	..	538.7

1 Based on average value of sales, f.o.b. mine site, excluding transport costs to market.
2 1981 data were used for Alberta.
SOURCE Based on data from Statistics Canada; Alberta Energy Conservation Board, *Review of the Alberta Coal Industry* (forthcoming); Canadian Petroleum Association, *Handbook*; and Brenda J. Dyack, "Western Canada's Coal Industry: Status and Potential," Economic Council of Canada (forthcoming).

A departure from the low and stable price trend for B.C. coal is evident from the table after 1971 when exports started. The trend is similar for Alberta's bituminous coal; price increases for domestically used subbituminous coal, however, were much lower. Price increases for lignite have been even more modest. Since coal used within the province is priced at the cost of production, with an allowance for some rate of return to capital, these small price increases reflect only the increase in the cost of production that has occurred for industries generally rather than the increased energy value of thermal coal. Compared with the price index for coal consumed by all electric utilities in Canada, the average annual price increases for thermal coal in Saskatchewan and Alberta over the 1971-82 period were modest – about 30 per cent less in Alberta and 14 per cent less in Saskatchewan. To a small degree, however, the differential may be due to the relatively lower energy value of the western coals used in thermal plants.

Potash prices exhibited more volatility, partly because of demand fluctuations and partly because of marketing problems. The potash price decreases that occurred from 1965 to 1971 are typically presumed to be the result of the large, new Saskatchewan supplies that were flooding the market at a time when demand growth was lower in comparison. The reversal in prices is attributed to provincial intervention in the market to regulate supply and thus stabilize prices.

Uranium prices have also been regulated. Prior to 1959 the federal government was the only authorized purchaser of uranium; it therefore set the purchase price directly. Special price incentives were offered to encourage development of mines that would have been uneconomical at the regulated price. Once the U.S. market was closed to Canadian producers, the Canadian government allowed private sales, and some small commercial sales were also made. Nevertheless, prices fell; and throughout the 1960s and the early 1970s the federal government operated stockpiling programs under which the uranium price was once again regulated. Uranium prices rose substantially in 1973 and then again after 1977. The gains in the early 1970s have been attributed to a combination of the influence of the oil price increases and the efforts of the uranium cartel in which Canadian producers participated.

The price increases for the West's exportable mineral commodities have been important, because for the most part they have been higher than those of goods imported into the West. As a general indicator of the relative price changes favouring the West, we compared the price increases for the minerals relative to those for manufactured goods.[3] The relative prices of minerals increased for virtually the whole past decade. The relative gains were large for uranium and coal but only modest for potash.

The Future of Mineral Markets

A number of published forecasts provide an indication of the prospects for potash, uranium, and coal markets.[4] The projections provide useful information for our review of the outlook for the mineral industries, particularly where demand and supply forecasts are concerned. But the typical forecasts exclude important market structure factors that can influence mineral prices. Since market price is a key concern in this study of growth opportunities for the mineral industries, we not only briefly review those forecasts but also discuss the market-dependent factors that affect prices. Our ultimate goal is to investigate how the general outlook compares with that of the past decade or so and, even more important, how it can be altered. What could improve the outlook for price and output, and what could hurt it? How can we change the outlook? What is within and what is beyond our control?

Potash

By recent historical standards the potash industry in Saskatchewan was depressed in early 1984, with production activity at only about 65 per cent of design capacity and real product prices at 60 per cent of their 1980-81 levels.[5] Relative to other past periods, the level of both activity and prices is not entirely discouraging. Prior to 1962, no potash was produced in Saskatchewan; now Saskatchewan has about three-quarters of the world's known potash reserves and 88 per cent of its resources. All other producers have much smaller, lower-grade, and more costly reserves.[6] Demand for potash is concentrated in developed countries (DCs), although demand growth is greatest in the developing countries or the less developed countries (LDCs). Problems with agricultural innovation in LDCs and constrained economic growth following the oil price increases have reduced potash demand growth recently. Many of these problems should be resolved in a few years.

Saskatchewan is the world's single largest exporter of potash, mainly to the United States. The United States is the world's largest importer, purchasing most of its potash from Saskatchewan. The Soviet Union, the next largest exporter, sells half as much potash abroad as Saskatchewan to its major markets in eastern European countries. Except for East Germany, other exporters are small. Geographically defined markets exist because of the high transport costs incurred in moving this bulky commodity. The advantages of Saskatchewan's low production costs are offset in many distant markets by the high costs of transportation. But its advantage is strong in the United States, and the potential is good for further exports to China, India, and Brazil, which are expected to be high-growth countries.

Forecasts of potash demand from industry sources project 3.5 per cent growth annually in world potash consumption over the next decade, with growth in LDCs expected to be almost 6 per cent and growth in DCs about 2.4 per cent. These forecasts make no explicit assumption about prices, and we presume therefore that fairly constant real prices have been assumed in estimating these rates of growth. Similarly, the supply-side forecasts make no explicit allowance for possible changes in prices, so again we presume that real prices are expected to remain constant. These forecasts suggest that expansions and additions to capacity will grow somewhat more slowly than demand, yielding a world supply/demand balance by 1992; presently there is considerable excess capacity. Some 56 per cent of the total increase in supply is expected to come from Canada, 65 per cent of it from new mines in New Brunswick. The outlook for real price increases is therefore not good, given the excess supplies that are expected over the next decade.[7] Hence the implicit assumption of real price stability seems reasonable and perhaps even a little optimistic.

Nevertheless, the planned expansions are expected to be feasible in Saskatchewan.[8] The quantity of production in that province is expected to rise by about 7 per cent annually, taking into account minor expansions at existing mines and the opening up of new ones. If there is no real price increase until after 1990 when world supply and demand are expected to come into balance, this will lead to a reduced rate of growth in real output value for Saskatchewan compared with that in the 1970-80 period, when the average annual growth rate in constant dollars was 15 per cent. The Saskatchewan potash industry is not expected to grow in importance at the same rate as it did over the past decade, in parallel with the growth slowdowns expected for the other major western resources, in the absence of policy action.

Some qualifications should be attached to these forecasts. Three of them concern factors external to Saskatchewan; the fourth, a very important one, relates to the impact of policy in the province itself. First, traditional market shares and Saskatchewan's primary position in world trade may change once new capacity in New Brunswick comes on stream and provided current Israeli sales to the U.S. corn belt persist. A continued drop in sea rates relative to rail rates will reinforce this effect. Second, any further declines in both seeded acreage and crop prices would have a negative impact on potash demand, although the effect on demand is unaccounted for in typical forecasts. Third, continuation of the world

recession, combined with the problems of the LDCs' ability to pay, will also contribute to a poorer demand outlook. In LDCs, the further problems of diffusion of knowledge at the farm, administrative, and government levels have contributed to the fact that the boom expected in potash demand in those countries has still not occurred. Fourth, the policy-related problem is the desire of the Saskatchewan government to encourage industry expansion in the province. If successful, this policy could actually cause real prices to decline over the coming decades, which might mean that total revenue would grow more slowly, in real terms, than the 7 per cent annually that is estimated. To determine why this is so requires some explanation of the nature of the potash market and of the potential influence of Saskatchewan potash production on the prices obtained from that market.

If the potash market had a large number of buyers and sellers, then price would be determined by the forces of demand and supply. In the potash industry, however, only a small number of large producers exist. Thus market power lies on the supply side, so that higher prices can be maintained while entry and supply are limited and prices are not bid down to a lower, perfectly competitive, level.[9] Certain characteristics of the potash industry explain why Saskatchewan producers collectively have this kind of market power. For example, potash, like many other natural resources, is not naturally well distributed throughout the world. Saskatchewan is endowed with much more low-cost potash than other areas. If other producers enter the market, they require a much higher price for their product in order to cover their costs and ensure a reasonable return on their investment. Relatively low costs provide Saskatchewan with an effective barrier to entry by others, but the barrier is only good as long as transportation costs to market do not dissipate the original production cost advantage. Another barrier is the very high capital costs of mine construction that must be incurred before others can enter.

Over 40 per cent of the world's exports come from the six Saskatchewan producers. The provincial Crown corporation, the Potash Corporation of Saskatchewan (PCS), alone owns 40 per cent of the provincial potash capacity. These few participants can be well informed about each other's activities, without overt collusion, and if they did collude they could more easily agree on behaviour than could a large number of firms operating in an industry. Since such a large concentration of supply occurs within one political jurisdiction, conflicts of interest between producing jurisdictions are not a problem; and since most potash is exported and not consumed domestically, the conflicts between producers who want high prices and consumers who want low prices are avoided.

Furthermore, the cost structure for each producer is fairly similar, suggesting that the industry could be viewed as one large producer with many plants that could split up and share the market and make similar unit profits. Actions by any one producer to expand sales through lower prices would reduce profits for all if price competition ensued; the incentive exists, therefore, to cooperate, overtly or covertly, to maximize joint profits.[10] If any individual producer should attempt to raise profits by expanding production and sales, the result would be destructive price competition and a dissipation of profits for all, as occurred in the late 1960s and early 1970s when all of Saskatchewan's present mines came on stream and prices fell dramatically. The province stepped in at that time with a quota and floor-price system to regulate supply and to maintain the product price; it later bought the 40 per cent of the industry capacity which is managed by PCS.

The individual or collective intentions of the current industry members in Saskatchewan are not public knowledge, but there is evidence to suggest that producers at least implicitly recognize the impact of their individual actions on their collective well-being. In the North American market, for instance, one firm typically posts a selling price (or price list), and eventually all firms are found to list similar prices. Recently the PCS appears to have been acting in this role as well as like a residual supplier in the market. Hence total market supply appears to be regulated through the actions of PCS, and this managed supply has the effect of managing price levels.[11] The actual motivation for the residual-supplier activity is unclear, however; PCS may be acting this way not because it wants to be a dominant firm but because it does not have the reliable contacts in the United States that other U.S. subsidiaries producing in Saskatchewan have. Fluctuations in its supply would not therefore be intentional.

The relative stability of U.S. prices compared with offshore prices is consistent with the view that prices and quantities are managed differently in the United States. Demand in the U.S. market is believed to be less responsive to price changes than in the offshore market; therefore, adjustments are made on the output side, and excess supply is more readily diverted to the offshore market. An increase in supply on prices is expected to have less of an impact offshore than in the United States.[12]

Bearing in mind the oligopolistic nature of the industry, it becomes clear that deliberate encouragement of rapid expansion in output in the Saskatchewan industry might be risky. If such a policy were

pursued by the industry, our supply and demand projections would definitely be altered. World production could be expanded significantly by production in Saskatchewan, even if only full capacity were used, since the current level is about 65 per cent of capacity. Further excess supply would depress prices, and given price-insensitive demand, the extra revenue obtained by the additional potash sales at lower prices would most likely not be enough to offset the revenue losses on the potash previously sold at higher prices. In other words, price declines would be large, while the increase in quantity sold would be small in comparison. While market share might be expanded at the expense of higher cost producers who would suffer losses at lower prices, that is unlikely because the high fixed capital costs of production imply that producers will not shut down as long as they can at least cover their variable, or operating, costs. Also, low prices would materially damage the U.S. producers in New Mexico and could bring legal action and charges of dumping against U.S. subsidiaries operating in Saskatchewan. All this suggests that the amount of growth the potash industry will generate in the West is heavily dependent on the degree to which Saskatchewan policy takes account of the market power the industry has.

Uranium

Saskatchewan recorded a very substantial gain in the real value of uranium sales over the past decade. The quantity sold increased fivefold from 1973 to 1982, while prices approximately doubled in real terms. Total value in real terms was therefore up about tenfold.

Our investigation of future possibilities suggests that the pace of expansion during the 1970s cannot be maintained into the next decade. Real prices are unlikely to move at all, and even to maintain them may require the major non-U.S. producers (Australia and Canada) to expand their output more slowly than in the past. As a consequence, uranium sales will continue to grow in real terms but at a much slower rate, just as noted in the forest products, oil and gas, and potash industries.

Short-term developments have been mixed. The average value of uranium sales by Saskatchewan producers fell in nominal terms from 1980 to 1982. In real dollars, the 1982 value of sales was 75 per cent of the 1979 peak of $49/kgU (1971$).[13] But 1983 average world prices were reportedly higher, and activity in Saskatchewan increased with the start-up of the large new Key Lake mine. Over the next few years this new high-grade mine will make Saskatchewan the leading uranium-producing province in Canada. In relation to the rest of the world, Canada has typically been the second largest producer behind the United States, with between 20 and 25 per cent of the annual world production, less than one-half of which was produced in Saskatchewan. Canada has over 10 per cent of the low-cost reserves that are known to exist with greatest geological confidence and over 22 per cent of the additional resources that are thought to exist but with lesser geological confidence.[14] With the numerous discoveries of high-grade deposits in Saskatchewan over the past 10 years, both the size of reserves and the production capability and potential are increasing in relative importance.

Saskatchewan and Australia are thought to be the main regions of future importance. The United States has the largest known reserve levels outside the communist bloc, as well as the largest production levels, but these are based on extensive past exploration and on production from relatively high-cost underground mines. Saskatchewan and Australia are only beginning to recognize the uranium potential they possess, and the new high-grade, large deposits are amenable to relatively low-cost extraction techniques.[15]

Reserves and production of uranium have always been highly concentrated worldwide, with the top five in terms of reserves having about three-quarters of the world's lowest-cost and best-known reserves. Those five produce over 80 per cent of the annual output. The world uranium industry is much less geographically concentrated than the potash industry, but uranium is not evenly distributed worldwide. In the mid-1970s this fact formed the basis of the uranium cartel, which included governments and producers in Canada, Australia, South Africa, and France.[16] The United States, which consumes at least as much as it produces, was not a participant.

Excluding the United States, the remaining four top countries in terms of reserves possess two-thirds of the low-cost resources in both the geologically well-known and less well-known categories, with Canada and Australia having the most. For producing countries the cartel provided a vehicle for raising prices and thereby revenues. Country quotas were set up, and participants agreed to both prices and market shares. Legal challenges originating in the United States, where consuming utilities were faced with quickly increasing prices, upset the cartel and led to its apparent dissolution. Whether or not the cartel was responsible for the real price increase of the mid-1970s is unclear, because OPEC's oil price increases also exerted upward pressure on uranium prices as consumers planned to substitute nuclear-based electricity-generating stations for oil-fired stations.

Uranium demand is concentrated in the industrialized countries, with the United States, France, Japan,

and West Germany having the greatest nuclear power capacities. The United Kingdom and Canada follow in rank, but Canada's capacity is only one-tenth that of the United States. Over 80 per cent of Canada's uranium production is exported. Saskatchewan has no nuclear capacity and no plans to develop any; therefore, all uranium is exported to the rest of Canada or offshore. In the past, Saskatchewan's distribution of sales revenues varied considerably. In 1978 and 1981, the proportion of their total value that went to West Germany was 55 and 27 per cent, respectively; to France, zero and 35 per cent; to Japan, 13 and 3 per cent; to the rest of Canada, zero and 11 per cent; and to the United States 9 and 11 per cent.[17]

The general outlook for uranium demand throughout the 1980s is much the same as that predicted for potash. Demand is expected to grow more slowly than during the 1970s, and a situation of excess supply capability is anticipated to place a ceiling on price increases, such that no real price increases can be expected in the 1980s. The greatest percentage growth in uranium demand is foreseen in the developing countries, if they actually adopt nuclear power at the rate now projected. In industrialized countries demand will grow at a slower rate, but the absolute change in reactor capacity will be greater than in the LDCs. Annual demand for uranium to fuel reactors, in noncommunist countries, is expected to be about 56,000 tonnes in 1990, which is 70 per cent higher than current levels.[18]

Current and planned expansions of uranium supply capability are expected to maintain the current situation of excess supply capability until after 1990, when existing stockpiles will be reduced. At current consumption rates, present stockpiles would cover up to five years' needs, while desirable levels would be in the two-year range. Recent attempts by traditional consumers (utilities) to reduce stockpiles through open market sales have led to further downward pressure on prices. Current spot market prices for short-term sales have been bid down considerably below the average of prices for all sales.[19]

The long lead times required to build reactors and develop mines should make forecasting over five to ten years somewhat simple, since predictions are based on current commitments and firm plans. Even in the short-term forecasts, however, the uranium industry has been perpetually plagued by overestimates since the early 1960s. Although ranges of demand are typically provided, subsequent estimates often place "high" estimates below the past "low" forecast. The reasons cited for the poor forecasts include the slower-than-expected substitution of nuclear for fossil-fueled electricity generation; the slower economic growth that led to slower energy demand growth; and greater energy conservation than had been expected. Current estimates are more conservative because of the lower estimates of real oil price growth and the worldwide recession. These have led to revised assumptions about the adoption of nuclear facilities to supply the growing demand for electricity as a substitute for oil.

Since the move to nuclear power is also highly controlled by governments, the assumptions about the rate of movement to nuclear-powered plants, and therefore the demand for uranium, are highly dependent on government policy; and how people view the safety of nuclear power clearly affects policy. Reactor accidents and nuclear fuel-handling problems throughout the world have raised the level of public awareness and in some cases led to decisions against developing further nuclear plants. The link between nuclear fuel, nuclear wastes, and weapons production is one more reason why public opinion can be against the use of nuclear power for electricity generation. The decision by Sweden to plan no further nuclear plants is one example of how policy can directly affect the uranium market.[20] Decisions to stop uranium production or to stop nuclear power development would equally affect the market.[21]

The long-run forecasts of how much nuclear-based power generation will actually be required and what sort of reactor will be adopted are highly influenced by government energy policies. These policies are typically off-oil policies, but public confidence in the safety of nuclear power facilities may moderate the move to nuclear technology. In some countries energy needs may eventually outweigh the perceived risk of implementing nuclear technology, but forecasts are still uncertain.

The longer-run forecasts of uranium demand are subject to even greater error, partly because a number of new technologies are available and might be adopted. In particular, the use of "breeder" reactors would reduce the need for uranium fuel if this technology were adopted in the next century. Reprocessing facilities, which could recover unused fuel after it had gone through a reactor once, would also reduce the need for new fuel supplies. These long-run uncertainties are in addition to possible improvements in the efficiency with which fuel is used.

The concentrated supply-side of the uranium market suggests that actual output offered for sale can be managed in such a way that price is maintained or even increased. Given that a cartel existed in the past coincidentally with large uranium price increases, there is reason to believe that uranium producers currently recognize the effectiveness of coordinated action. Overt agreement, as in a cartel, is

not necessarily required for action if producers collectively respond to the same signals. The signal that appears to be guiding uranium producers is the price at which U.S. requirements can be met by domestic sources. The mechanism to ensure that this price, or some floor price, is followed is government uranium export policy in the two major non-U.S. producing countries – Australia and Canada. Australia has announced a floor price of U.S.$78/kgU (1980$). This is the price at which industry sources believe the relatively high-cost U.S. producers can supply U.S. needs, at least until 1990. Australian costs are much lower; therefore, producers in that country could sell uranium at lower prices and still make a return on investment. At higher prices, U.S. producers presumably could compete with their Australian counterparts, and at lower prices it is assumed that the United States would attempt to protect domestic producers by limiting uranium imports.

In terms of real U.S. 1980 dollars, the average value of Saskatchewan sales was below the Australian floor price in 1981; the estimated average prices for 1983 show that real prices were about $10 below that limit. The floor price set by the Canadian government is confidential, but it is apparently set at the estimated *world* price.[22] The resulting market price is partly the result of sales made under previous contracts, and these prices must rise with the inflation rate. The declining value of the Canadian dollar in terms of the U.S. dollar, however, has the effect of lowering the price (in $U.S.) of Canadian uranium. For example, if $1(Cdn.) still exchanged for 86¢(U.S.), as it did in 1980, then the average uranium price in 1983 would only have been $6(U.S.) below the Australian floor price of U.S.$78/kgU (1980$).

In summary, the main messages for the uranium industry are that some growth can be expected during the 1980s and 1990s but at a much slower pace than in the 1970s. Even this pace of growth will require a continuation of the considerable caution towards price setting and expansion of production that Australia and Canada have recently displayed.

Coal

The current depressed conditions for coal contrast with those in the 1970s. Output of thermal coal, used mostly domestically for generating electricity, grew by 215 per cent from 1970 to 1981 in Alberta and by 100 per cent in Saskatchewan. Most exports are of metallurgical coal, and growth in export demand was the main reason that coal production in British Columbia grew by over 300 per cent between 1970 and 1982 and that that of bituminous coal in Alberta grew by 100 per cent from 1971 to 1981.

The increasing price of thermal coal used domestically mainly reflects the increasing costs of production, though real costs have not really risen. For exported coal, however, real prices increased during the 1970s, peaking in 1976. Since then, the trend has been downwards.

The real price increase in the 1970s was dramatic, with levels for both the B.C. and Alberta coal having risen about 80 per cent between 1971 and 1980. Since then, real prices have remained constant in British Columbia and risen in Alberta. The most recent downturn in world coal markets has meant that consumers have in some cases taken below-contracted volumes. As a result, the prices for short-term coal sales worldwide have dropped.

The industry outlook in early 1984 was for much more moderate increases in production in response to more moderate demand growth. The general expectation is that there will be no real price increases for coal in the near future. In other words, the story is the same for coal as for a whole series of western resources. Growth will continue but much more slowly than in the past.

Coal producers in the West are unlike their uranium and potash counterparts in that they have no very important advantages over their competitors. World coal resources are more widely distributed than most other minerals. Because of the indigenous coal endowments of major coal users, coal trade has been small and has been dominated by the imports of those major industrialized countries that are not so well endowed with coal, especially Japan.

The United States, Australia, South Africa, and Poland were the world's major exporters of coal in 1982, followed by the Soviet Union and Canada. Chase Econometrics' preliminary estimate of world trade in coal was 284 million tonnes in 1982, 34 per cent of which was accounted for by the United States and 6 per cent by Canada. The same four countries dominated world trade of thermal coal – about 110 million metric tonnes – while Australia, the United States, and Canada dominated the metallurgical coal trade. Canada's share of the total metallurgical coal trade – 174 million tonnes – was about 10 per cent.

Japan is the world's major metallurgical coal importer, taking 60 per cent of total OECD imports and almost half of all imports. For thermal coal, no single country dominates, but France imports the most. The OECD, as a whole, imports three-quarters of both types of coal.

Japan is a major world steel producer, following North America and the Soviet Union. Western Canada benefited from the growth in Japanese steel production in the 1970s through its demand for

metallurgical coal. The uncertainty about the growth of demand for coal to be used in steel production in Japan lies behind the pessimism about the future rate of growth of world demand for metallurgical coal. Australia and the United States provided most of Japan's imports throughout the 1970s, while western Canada was the third largest supplier; its share fluctuated annually from 10 to 20 per cent.

Recently the growth of Japanese demand for metallurgical coal has been affected by a number of changes in technology and economic parameters that will continue to bear on that demand. On the technological side, in steel making, changes enabling the substitution of fuel oil for metallurgical coal and the general improvements in production efficiency imply a reduction in the need for coal per unit of final product.

Changes in the technique used to make steel – from the basic oxygen furnace, which uses metallurgical coal, to the electric arc furnace – have already taken place in Japan, and further major shifts are not expected. In new steel-producing countries, however, if the electric arc furnace is preferred because of its relatively small size and related ease of expansion, then demand for metallurgical coal will not rise to replace reductions in the rate of growth of Japanese steel production. In addition, Japan is expected to lose some of its growth potential in steel making because of competition from the lower-cost, new producers in South Korea, Taiwan, and South America, for example.

Other market factors also affect the overall Japanese demand for metallurgical coal. Plastics are now substituted for steel in traditional markets such as the automobile industry. Japan's coal suppliers are faced, therefore, with moderated growth in tonnages and prices. Given the excess of supply potential available from its suppliers and because Japan is the major market, that country has the potential to reduce both price and tonnages.

Along with the structural changes that are affecting coal demand, shorter-run pressures cause fluctuations in the value and volume of coal traded. For instance, steel demand is highly susceptible to changes in economic activity. During recessionary periods such as the one from which we are apparently emerging, demand for steel declines and thus the demand for coal as well. Recent cutbacks in imports and in prices paid by the Japanese attest to this effect. Volume cutbacks for Japan's suppliers have ranged from 10 to 50 per cent of contracted amounts. The larger cutbacks typically affect short-term contracts, while the smaller cutbacks affect the long-term supply and price contracts of new projects. The older, long-term contracts that allow for annual price determination have suffered volume cutbacks of about 30 per cent.[23]

But although the short-run fluctuations are damaging to the coal suppliers, particularly if the market is in chronic oversupply, the major concern must be with long-run changes. Coal producers have apparently accepted the long-run decline in the demand for metallurgical coal relative to that of thermal coal demand. The reaction in Canada's case has been to look to other markets, especially in the Pacific Rim, where new steel capacity is being installed. But general factors affecting worldwide steel demand suggest that growth, even there, will not come close to restoring past rates of growth.

The most noticeable reaction by the Canadian industry to expected slow growth in metallurgical coal markets is to shift their plans to thermal coal projects. The growth in thermal coal trade is directly related to the oil crisis of the early 1970s, which stimulated the demand for alternative sources of energy. Coal has been called the "Bridge to the Future," where the future implies worldwide reliance on as-yet-commercially-unproven energy technologies such as fusion energy.[24] Increased demand has raised the real price for coal somewhat, so that the coal supply has been stimulated. But with oil being cheaper recently as a result of the slowdown in economic activity and conservation, there has been a slowdown in the conversion of thermal plants to coal and some reduction in coal prices.

Transportation costs still represent a sufficiently large proportion of delivered coal prices to limit the geographic scope of trade in thermal coal. Canada's trade has been mainly restricted to the Pacific Rim, predominantly Japan. The U.S. East Coast, Australia, South Africa, and Poland are more favourably located to service the European market. Analysis by the World Coal Study on thermal coal transport costs and delivered prices showed that western Canadian coal, delivered to either northwest Europe or Japan, has almost the highest land transport costs to port. Marine transport costs are higher for Canada than for Poland, South Africa, and the United States for delivery to Europe and higher than Australia for delivery to Japan. The net result of transportation and handling costs means that U.S. and western Canadian coals are the highest-priced in Japanese markets.

Transportation facilities have expanded in Canada to accommodate the projected growth in metallurgical coal exports from western Canada. Except for some bottlenecks at a few rail locations, no problems are expected, especially since the Crow Rate legislation has been passed and the necessary funds will be made available to enable the rail companies to

complete their improvements. Coal port facilities are, or soon will be, adequate, given the major expansions currently taking place on the west coast, notably at Roberts Bank and the Ridley Island terminal, which will service the northeast coal developments, as well as other bulk commodity exports such as grain and potash.

Canada's high delivered costs, Japan's powerful position as the largest single buyer, and the presence of numerous other suppliers, all put Canada at considerable risk in selling coal. That is not to say it is not worth doing; far from it. Nevertheless the problems involved should not be underestimated. If demand were to weaken worldwide, for example, prices might drop to the point where heavy infrastructure costs could not be recouped. Long-term contracts are no insurance against such price revisions, because typical clauses therein allow for renegotiation of the price should the market indicate a revision by either producer or consumer.

Direct investment by companies of the consuming countries in the production of western coal will not necessarily solve the problem. The West has encouraged such investment on the grounds that consumer participation will secure long-term demand. This policy is also compatible with the economic development, or growth, goals of the provinces. Yet, although direct investments by consumers may indeed mean that the developments will not fold, deep price cuts and volume reductions remain possible, because these will not necessarily hurt the overall financial position of these typically integrated investors, especially if the coal prices paid to other producers are reduced as a result.[25] Their losses are balanced by benefits obtained elsewhere, while provincial losses are not. Workers become unemployed, coal producers and provinces lose revenues, as prices and the total value of provincial coal sales fall. The costs of certain dedicated infrastructures become a lost sunk cost, which in effect becomes a subsidy to Japanese steel production. This is ironical, given the fact that Canada is also a steel producer.

The moral is straightforward. Insofar as governments are involved in coal expansion, they should try to ensure that their policies do not burden Canadian taxpayers by imposing on them any costs associated with the enhancement of Japanese market power.

Policy Issues

The market structure of the mineral industries provides our main area of concern. This is especially true for potash and uranium, where supply-side market power exists. Exploitable resources for these minerals are extensive, but increasing the supply too rapidly relative to the demand could lead to lower world prices or a lower rate of price growth, which in turn would offset, or more than offset, increases in quantities sold. The problem facing the West, therefore, is not the availability of supply but the determination of how far the growth in prices of these resources should be deliberately influenced through management of their rate of output growth.

Recent initiatives by the Saskatchewan government affecting the potash industry appear to be based on the assumption that there is a large enough number of suppliers that changes in supply by Saskatchewan would in no way affect the price at which potash could be sold. Our evidence shows, however, that this is not so; Saskatchewan supply is a significant fraction of the world total. The same is true for uranium. Thus supply management of the provincial production of both potash and uranium would appear to be desirable in order to increase provincial income. But nothing is that simple. Certainly the provincial government could take better advantage of the underlying market structure of the potash and uranium industries so as eventually to obtain substantially more revenue from the sale of these minerals. A cartel would not be necessary; rather, judicious and sophisticated use of Saskatchewan's and Canada's market power would suffice.

We considered but rejected the idea of recommending such use of market power, which would, incidentally, require federal government cooperation and further substantial research into the structure of the potash and uranium industries. The reason is that the use of market power in this way would be inconsistent with the spirit of Canada's commitment to both freer world trade and the canons of good international behaviour. Exercising our market power would not penalize poor countries because, in potash, the main consumer is the United States and, in uranium, the main consumers are all rich countries. Rather, against the monetary gains from exercising market power should be set certain national losses, both monetary and political. The monetary losses would come from any effect that our actions might have in slowing down the international movement to freer trade. The political losses, which we judge the more important, would come from the risk of tarnishing Canada's traditional reputation for avoiding narrowly nationalistic behaviour. This reputation gives Canada influence disproportionate to her size, we believe, in promoting international cooperation in all areas, not just economic. Such a valuable national asset should not be lightly compromised. At the same time, the cost of preserving the value of this asset, by choosing not to exercise market power in potash and uranium, falls disproportionately on the residents of Saskatchewan.

In the case of coal, where market power exists on the demand side rather than the supply side, the issues are necessarily different. If the market continues along its projected path, market power will remain vested predominantly in the major export market – namely, Japan. Market growth in Japan is expected, but as the August 1983 federal trade policy document noted, Japanese markets for our goods continue to remain relatively more important to Canadians than are Canadian markets to the Japanese. The West's overdependence on one market leaves it vulnerable to real income losses through potential price and volume cutbacks. Not much can be done about this, but we could place more of the risk on those with most incentive to recognize it.

In this connection we know that there is often subsidization of infrastructure costs for coal extraction by the federal and provincial governments. The federal position is to subsidize these investment costs only where the new facilities, such as railways or ports, will benefit many industries and where confidence in their future use exists. In this way future rate payments will contribute to the financing. Infrastructure that is dedicated to one industry or one resource is not financed "up front." Alberta has taken this position also, but British Columbia has not; therefore, the public in the latter case stands to bear a good proportion of the losses if further coal developments do not materialize in this decade and if coal prices are not adequate.[26] Under these circumstances the incentive in the private sector to avoid unduly risky contract terms is lessened. We believe that it would be better to increase this incentive, in light of Japan's great market power. Therefore,

21 We recommend that industry in all provinces bear a substantial part of the costs of the provision of dedicated investments related to new developments, in order that a significant part of the risk of demand uncertainty falls on the private sector.

Another set of policy issues focuses on opportunities to improve the efficiency of resource use in these three industries, which in turn will lead to an improved income outlook. We have concentrated on taxes, domestic pricing, and upgrading policies.

The structure of resource taxation can at times impose excess burdens on an industry. For example, resource taxes calculated as a percentage of revenue may mean that taxes are payable even if no profits are earned. Such a tax also has the potential to distort the extraction plans of mine owners. As a result, the tax system itself can lead to altered rates of extraction, exploration efforts, cutoff grades, and the working span of a mine. This sort of tax applies to coal operations in both British Columbia and Alberta. A tax based on profits might have the potential to reduce these distortions, but it could also introduce some problems of its own.

British Columbia imposed a profits tax on mining firms, but it has been ineffective in raising revenues regardless of the profitability of individual mines. This is because mining firms calculate tax based on the net income from all operations, with cost deductions allowed for exploration and development expenditures for the whole province. Profits generated by a particularly lucrative operation can be offset by expenditures on a new venture. Saskatchewan found that its uranium royalty system, which was similarly structured, biased new operations and made them excessively large; moreover, too much exploration was encouraged given the market conditions from uranium. Both provinces have since adapted the royalty system so that a more restricted set of cost deductions is allowed. The Saskatchewan royalty plan still encourages developments that are larger and use more capital relative to labour, because of the full-cost recovery plan that keeps royalty rates constant and low. Once costs are recovered, the rate increases with profitability, and the share of total revenues going to the province also increases as the price increases. This gives producers a diminished incentive to have the most favourable price formula written into contracts.

Because of the possibly distortionary impact of resource tax (or royalty) systems,

22 We recommend that royalty systems be designed so as to be as neutral as possible. A profits tax should be employed wherever feasible.

We might add that an important criterion in designing tax systems for the potash and uranium industries is that they recognize the realities of Saskatchewan's market power. For example, added incentives to expansion offered through the tax system, as apparently being considered at this time in Saskatchewan, could lead to destructive competition, lower prices, and, in the end, considerably reduced total tax revenues.

Distortions also exist in the domestic pricing of coal. It has been the practice in the West to sell coal – and natural gas, in particular – at prices below those in the rest of Canada or the world when the minerals are being used domestically. This means that domestic consumers are subsidized in the West, since the coal that is consumed at power plants is priced at cost rather than at some value based on its price for alternative uses. This might entail export to another province or to the United States in the future when some return in excess of cost might be obtained. Transportation costs currently raise the price of the coal too high to make it competitive on a

delivered basis, but this may change in the future as the value of thermal coal rises with the price of its alternative – namely, oil. When coal is not valued for its next best use, then coal may not be directed to its most socially efficient uses. Therefore,

23 We recommend that the provinces refrain from subsidizing consumers of electricity by pricing domestic thermal coal at cost.

Our final concern is the attempt by both the federal and provincial governments to increase the level of processing of primary resources before export. These "upgrading" policies are aimed at raising the level of value added that is generated here in Canada. But such a goal is not necessarily desirable. If it were artificially encouraged in circumstances under which it would otherwise not pay, the real income of westerners, and indeed all Canadians, might decrease rather than increase. This issue relates mainly to uranium, since potash and coal are ultimately used in much the same form in which they leave the mine. The federal uranium export policy explicitly includes the level of processing as a criterion in allowing exports. Since Eldorado's new refining facilities at Blind River, Ontario, will be large enough to process all Canadian uranium destined for export for many years, there may be a major area of policy conflict in the near future. A conflict could arise if uranium buyers were only in the market for uranium concentrates and would not buy refined uranium. Hence the federal policy has the potential to restrict sales of Saskatchewan uranium and therefore inhibit growth of the industry. Consequently,

24 We recommend that the benefits to Saskatchewan of exporting unprocessed uranium be recognized by the federal government, especially when these exports do not replace refined uranium exports from Ontario or other provinces.

We believe that our four recommendations could increase the contribution to be made by these three minerals to growth in living standards and employment in the West. Nonetheless, we recognize that a rate of growth in production and in sales of potash, uranium, and coal as rapid as that of the 1970s cannot be sustained. The outlook for these industries is still good. Growth will occur, and at a respectable rate, as our economy moves out of its recent slump. But the pace of growth will be more modest than that to which the West has recently become accustomed.

9 The Fishery, Tourism, and Water Resources

The forestry, oil and gas, some agricultural products, potash, coal, and uranium, together account for a large proportion of all western production and exports. Overall, the remaining natural resources are minor, even though they can be very important in particular areas. Time and financial constraints prevented us from dealing with most of them. Nevertheless, two of these western resources – the fishery and tourism – were repeatedly mentioned to us by westerners as potential sources of growth. Another western resource – water – was also mentioned often but for a different reason. Many fear that water, or rather its lack of availability, could be an important constraint on future growth as well as, somewhat paradoxically, a future export. In this chapter we examine the growth prospects for fishery and tourism, and the role of water resources.

The West Coast Fishery

The fishery in British Columbia is a small industry. In 1981 it accounted for less than 0.5 per cent of the labour force and for a similarly small percentage of GNP. While enormous scope exists for greater efficiency, as we shall see, the scope for increasing output is probably negligible. Since the industry is small and unlikely to grow, it cannot be expected to provide much stimulus to B.C. growth.

An enormous amount of research has already been done on both the east and west coast fisheries, and we shall not add to it here. Rather, we shall draw a few major inferences from the work available.

A recent B.C. Royal Commission report warned that "Canada's Pacific fisheries are at a crisis point" and then went on to explain:

> We begin with a paradox. We have some of the world's most valuable fish resources. They are capable of yielding great economic and social benefits; yet many commercial fishermen and fishing companies are near bankruptcy, sport fishermen and Indians are preoccupied with declining opportunities to fish, and the fisheries are a heavy burden on Canadian taxpayers.
>
> The problems now facing the Pacific fisheries are numerous, grave and very complicated. They include overfishing, conflicts among users, overexpansion of the fishing fleets, and eroding marine and freshwater habitat. As one group put it at the public hearings, "the problems in the industry boggle the mind. On every hand there is a crisis and a fundamental problem that must be solved," and words "dilemma," "predicament" and "chaos" were commonly used.
>
> Major and fundamental changes in fisheries policy are needed to correct this situation . . . .
>
> . . . my inquiry pointed inescapably to deficiencies of government policy: uncertain objectives, weak and outdated legislation, bad organization, contradictory programs and confusion. The cost of this disarray has been staggering. I emphasize this at the outset not to cast blame but rather to explain the context of what follows.[1]

In 1981 the Economic Council reached similar conclusions.[2] The nature of the problem can be outlined briefly. Conditions in an unregulated fishery are such that continued fishing causes the fish stock to be reduced well below what is socially the most beneficial level. Until recently we did not know how to devise clever enough regulation to avoid this problem (and for some species of fish, we still do not know), but even when we learned how, the application of our newly found knowledge still lagged. The effect of past regulation has been, by and large, to prevent most of the reduction in fish stocks that would have occurred in its absence, but only at the cost of side effects that have nullified the benefits of the regulation. In particular, the "fishing power" (or catching capacity) of the fleets is much larger – often, many times larger – than is needed for the quantity of fish available. Fishing seasons are often short, sometimes as short as minutes! Expensive equipment sits idle most of the time. Thus, while approximately the right amount of fish is caught, it is caught at wastefully high expense.

How does this happen? A full explanation is complicated, so we shall rely on an analogy which, though imperfect, is instructive. Unrestricted hunting on the Prairies led eventually to the extinction of the buffalo. Even before that happened, the herds were very much smaller than they would have been if Indian society had allowed land ownership and "buffalo ranches" and then forbidden the killing of buffalo by nonowners of a ranch. The lesson is that unrestricted hunting of a valuable wild animal leads to much lower stocks than does a system where property rights to a species exist. Moreover, the higher stock of animals under such a system is desirable, since society as a whole will be richer for it.

The analogy holds for fish as well, except that the last few fish are often so hard to find that unrestricted

"fishing" rarely leads to total extinction of the species. Nevertheless, the fish stock becomes much lower than is socially desirable when property rights for the fish do not exist. If they did, the owners of the fish would have a strong incentive not to overfish.

The solution is to find some way to restrict access to fishing. Complex questions then arise. How much access should be allowed; that is, what should be the permissible catch? That varies with the species, the area, and a host of other factors, including the discount rate. How should access be policed? Past attempts have included restrictions on the number of fishermen, the number of boats, the length and tonnage of the boats, the type of equipment on the boats, and many other factors, alone or in combination. Such regulation has invariably failed. There always seems to be a way, which the regulators have overlooked, for an individual fisherman to increase his catching power legally. The regulations become steadily more labyrinthine, and still they fail. In the end, the regulators are forced to control the time allowed for fishing, as well as the amount of equipment. That preserves the stock but creates excess fishing capacity.

The present solution favoured by analysts is to restrict the catch, not by restricting fishing power and fishing time but by licensing people to catch a limited quantity of fish. A quota of so many tonnes per season would be set and divided among fishermen. The Royal Commission suggested a quota system for most species of fish except the two most important – namely, salmon and roe-herring. For the latter, different controls were suggested in yet another attempt to control fishing power. Quota licensing requires knowledge each year of how many fish should be permitted to be caught, and this information is presently impossible to obtain for salmon and roe-herring, given the great variability in stocks.

Often a quota system is accompanied by proposals that licences to fish the quota be auctioned and transferable. Under this quota system there would be no incentive for licensed owners to overinvest in fishing capacity. That would lead to a very sizable decrease in the total cost of catching the quota allowed. The costs would in fact fall well below the actual value of the fish caught. For this reason, the proposals usually include the provision that once a reasonable profit has been allowed for the fisherman, any further profits beyond that point be captured for the Crown through royalties. Alternatively, revenue could be captured by auctioning licences.

The Royal Commission left a number of important issues untouched or insufficiently emphasized. Fish supply was emphasized much more than demand. The problem of migratory fish needed more attention, perhaps, as did the fish-processing industry. Nevertheless, we found that the changes suggested by the Royal Commission would generally be beneficial, and we are especially anxious to have its proposed methods of controlling the catch of the various fish species seriously considered. Consequently,

25 We recommend the speedy adoption of the principal ideas of the Royal Commission on Pacific Fisheries Policy on how to limit the catch in the B.C. fishery – namely, through the use of quotas in most cases, except for salmon and roe-herring, to which revised controls on fishing inputs would apply.

The gains would be very large in view of the rather small size of the industry. The Commission estimates that they would amount, in a few years, to approximately $100 million annually.

From our point of view the possible stimulus to western growth from reform of the fishery is of most interest. Unfortunately, it would be very small because, essentially, all of the gains from rationalizing the fishery would accrue to Canadians in general rather than to British Columbians in particular. The gains would be made from royalty payments, licence and auction fees, and a reduction in the need for subsidies. Given federal control over the fisheries, all of these would accrue initially to the federal government. British Columbians would benefit but only in proportion to their population, so that about one out of eight dollars in gains from the fishery rationalization would accrue to them. There would be little, if any, stimulus to growth of the industry itself because the reforms would decrease the cost of catching the fish much more than they would increase the total volume of fish caught.

We think that this asymmetric distribution of the gains could inhibit action to achieve changes, since it would require British Columbians to do things differently but not other Canadians (except federal government officials). Change might be facilitated if the British Columbians directly affected had a financial interest in the gains. Consequently,

26 We recommend that ways be sought whereby part of the federal revenues to be obtained from rationalizing the B.C. fishery could be used to provide incentive for change to those most directly concerned.

In sum, we conclude that the fishery can, and should, be reorganized. In general, all Canadians would benefit. A reorganized fishery would not, however, provide any significant or special stimulus to growth of the British Columbia economy.

Travel and Tourism

Tourism, though a service industry, is unlike most other service industries. Its nature is that of an "export" or import-substituting industry. In this key respect it is more akin to the natural resource industries than to most other service industries. Attractive scenery, ski slopes, and recreational facilities are actually exportable resources that buyers consume *in situ*. The demand for tourism is very responsive to rising real incomes, making it a strongly growing industry, recessions aside, in many parts of the world. Since the West is endowed with natural beauty and recreational attractiveness, tourism might be a major growth resource, substituting in part for a decline in the dynamism of the natural resource industries. How likely is this?

Our admittedly somewhat limited assessment of the evidence leads us to conclude that tourism could certainly help to stimulate growth in the West. Nevertheless, its importance should not be exaggerated, since its prospects are for steady rather than spectacular growth.

The tourism and travel industry is an industrially fragmented sector of the provincial and national economies, its primary components being: accommodation services (hotels, motels, lodges, public and private campgrounds, trailer parks, and resorts); food services (restaurants, coffee shops, fast-food outlets, taverns, and bars); transportation services (airlines, bus companies, railways, car and truck rental agencies, shipping lines); the travel trade (tour operators and wholesalers, travel agents, travel trade press and media, and the hospitality industry); recreation services (parks, ski areas, hunting and fishing lodges, golf courses, and wilderness areas); entertainment services (museums, theatres, historic sites, festivals and special events, such as the Calgary Stampede and winter festivals); and various industry associations. Some industries, such as accommodation services, are oriented primarily to the needs of tourists and travellers; others, such as the food industry, may derive only part of their sales from tourists, the larger part being derived from local customers.

Besides having a mixed industrial composition, the tourism and travel industry also displays variety in other ways. Types of businesses range from small, independent operators to large, international organizations. And, while in some regions the market consists predominantly of pleasure and recreation activities, in others it consists predominantly of business-generated travel.

Statistical measurement of the size of the industry and of its contribution to the provincial economies is difficult because the tourism industry is not distinguished in published data. What we have are data measuring the level of tourist and traveller expenditures in each province, and only for 1980. These provide an estimate of gross output for the industry.[3]

Table 9-1

Gross Provincial Output, by Industry, Canada, 1980

	Output, by industry						Tourist/ traveller expenditures
	Agriculture	Forestry	Fishing	Mines, quarries, and oil wells	Manufacturing	Construction	
	($ Millions)						
Newfoundland	33.3	x	161.7	1,028.9	1,214.4	626.9	1,009.9
Prince Edward Island	167.7	x	27.0	–	284.5	130.4	
Nova Scotia	209.5	108.9	232.6	212.3	3,972.5	913.6	
New Brunswick	176.2	320.4	49.0	274.9	3,881.9	724.9	
Quebec	2,422.1	942.0	43.2	2,341.4	50,504.7	6,503.7	2,266.8
Ontario	4,677.0	826.6	23.6	4,160.9	97,672.6	9,665.0	3,629.0
Manitoba	1,404.5	44.9	16.9	729.8	4,955.6	1,007.0	553.5
Saskatchewan	3,512.3	57.7	3.6	2,358.3	2,312.4	1,610.5	549.8
Alberta	3,496.3	108.9	1.3	16,659.8	11,403.5	8,168.1	1,453.4
British Columbia	790.7	3,922.0	183.0	2,747.0	17,250.2	5,150.8	2,000.8
Canada[1]	16,889.6	6,408.5	744.4	31,457.7	193,488.0	35,027.1	11,715.2

1 Includes the Yukon and Northwest Territories.
SOURCE Based on data from Statistics Canada.

In each of the western provinces in 1980, gross output in the tourism/travel industry ranked fifth after agriculture, mining, manufacturing, and construction in Alberta, Saskatchewan, and Manitoba, and after forestry, mining, manufacturing, and construction in British Columbia (Table 9-1). Tourism and travel receipts were rather small in most of the West. If value-added contributions mirrored gross output contributions, tourism as a percentage of gross provincial product would be between 1 and 4 per cent in Manitoba, about 2 per cent in Saskatchewan, between 1 and 2 per cent in Alberta, and 3.5 per cent in British Columbia. This would rank it substantially below construction in Manitoba and with utilities in Saskatchewan and Alberta. In British Columbia, the tourism and travel industry would be much more important – about twice as large as agriculture and almost as big as the logging division of the forest products industry. These numbers include local travel. Without this, the industry would be very much smaller – perhaps only one-quarter as large.

The tourism and travel industry experienced some growth during the 1970s, but we cannot tell precisely how much because of the lack of time-series data. The indications are that growth slowed considerably in the early 1980s, but this is clearly a short-term phenomenon reflecting the sensitivity of the industry to downturns in the economy.

In 1980 Canadians accounted for close to 75 per cent of all trips within Canada and for 78 per cent of nights spent away from home. Furthermore, 87 per cent of all trips were confined to the traveller's province of residence. Thus almost three-quarters of tourist expenditures do not represent invisible exports by the provinces.[4] Also, although an origin/destination matrix is not available, a further substantial part of the tourism and travel likely consists of travel between neighbouring provinces. The result is that even if the volume of tourism were to increase substantially in the West, only a relatively small proportion of the increase would originate in the rest of Canada; therefore, the amount of revenue attracted from outside the region would not be large.

The remaining quarter of the trips were made by foreign visitors, mostly from the United States (Table 9-2). British Columbia received most of the travel expenditures in the West each year, followed by Alberta, Manitoba, and Saskatchewan. Growth in the level of expenditures by foreign visitors between 1973 and 1980 was greatest in British Columbia and Alberta compared with that in the whole of Canada. Growth was almost at the national average in Saskatchewan but lagged considerably in Manitoba.

In 1973, however, residents of the four western provinces spent more abroad than international visitors spent in the provinces. Alberta and British Columbia had a positive balance with respect to the United States; in Manitoba the balance was even, and in Saskatchewan it was negative. The balance on the overseas account was negative for all western

Table 9-2

Expenditures by International Travellers to and from Canada, by Province, 1973 and 1980

	1973				1980				
	U.S. visitors to Canada	Canadian visitors to United States	Overseas visitors to Canada	Canadian visitors overseas	U.S. visitors to Canada	Canadian visitors to United States	Overseas visitors to Canada	Canadian visitors overseas	Change in visitors to Canada, 1973-80
	($ Millions)								(Per cent)
Atlantic provinces	71.0	48.0	7.0	18.9	102.7	89.9	22.2	35.9	60.1
Quebec	216.0	199.0	45.4	115.8	320.6	509.0	150.2	273.6	80.1
Ontario	405.0	367.0	94.7	244.5	706.9	900.3	316.1	563.0	104.7
Manitoba	36.0	35.0	2.9	15.4	49.4	101.6	14.1	30.1	63.2
Saskatchewan	12.0	18.0	1.8	7.5	21.7	70.8	7.1	22.8	108.7
Alberta	68.0	56.0	9.8	30.8	107.5	246.5	85.9	97.1	148.6
British Columbia	106.0	92.0	31.1	63.2	283.8	354.4	144.0	164.5	212.0
Total[1]	914.0	815.0	192.7	496.1	1,592.6	2,272.5	739.6	1,187.0	110.7

1 The figures for British Columbia include the Yukon and Northwest Territories in 1980.
SOURCE Based on data from Statistics Canada.

provinces. By 1980 the negative balance on the total travel account had worsened in all provinces but British Columbia. Although substantial gains were made in reducing the deficit on the overseas travel account, these were more than compensated for by substantial losses on the U.S. travel account.

In future, it is difficult to see why there should be any major change in the growth trend for the industry. Tourism and travel will of course grow steadily, with increases in the standard of living. But faster growth in the tourism industry would require a shift in the relative appeal of western Canada as a tourist attraction compared with the rest of Canada or abroad. This would involve more than just "keeping up." Our canvass of pertinent literature and of provincial tourism departments gives us no reason to expect a dramatic shift in tourism to the West.

At best, the tourism industry might make a contribution to an increase in living standards in the West if the industry were to experience productivity growth as part of a wider emphasis on productivity in the service sector, particularly in the transportation and communications industry, the accommodation and food industry, and the recreation and entertainment industry. Tremendous growth in productivity has been realized, for example, in the transportation, travel trade, and accommodation industries with the introduction of computerized booking. Technological changes have also contributed to increased efficiency in communications and consequently in the organization of special events and in the advertising of such events. Similarly, increased specialization and agglomeration economies contribute to productivity in the service sector as well. These are discussed in more detail in Chapter 11. Tapping these sources of efficiency growth is of particular importance to the tourism industry, since it is export-oriented.

Water Resources

The long-term supply of water is a much-debated and emotion-laden subject. Some say that Canada's western provinces, like the country as a whole, are rich in water. Others say there is a scarcity of water in the southern part of the Canadian West and that this scarcity could well grow to crisis proportions by the end of this century.[5] Still others maintain that western Canada could become an exporter of water to the arid U.S. Midwest and Southwest or that, if not, it will eventually enjoy a comparative advantage in certain agricultural products over those states which are less well endowed with water.

The very limited information available suggests that, compared with the past, the availability of water will be neither a major engine of western economic growth nor a substantial hindrance. The importance attributed to water supplies seems to be at this time somewhat exaggerated, for intelligent water management can prevent emerging water shortages even in the most vulnerable regions – namely, those in Alberta. Over the very long run, diversion of water from northern rivers may become a reality. But massive interbasin transfers of water, including exports to the United States, appear to have prohibitive economic costs, and they would raise very serious environmental and political concerns. We shall say little about such projects, because we had neither the research resources nor the time needed to investigate the various proposals pertaining to water transfers.

Before discussing the availability and use of water, we must clarify the concepts employed. Water supply is measured in terms of reliable flow. The two commonly used measures are reliable annual flow (the flow available in 9 out of 10 years); and reliable montly flow (the lowest monthly flow experienced in 10 years). Reliable monthly flow is the more stringent measure. Three kinds of water uses are cited: in-stream use – navigation, hydro-electric power generation, and recreational, such as swimming and boating; withdrawal; and consumption. The difference between withdrawal and consumption is discharged back into the water body from which it was withdrawn, and this water becomes available for renewed use. Water withdrawn and not consumed may, however, have become polluted, heated, or otherwise qualitatively degraded in the process.

In western Canada, consumption accounts for about 20 per cent of withdrawal (Table 9-3). The biggest consumers are agriculture, for irrigation; and mining, for secondary oil recovery, synthetic crude oil production, and coal mining. Thermal power generation, which uses water for cooling purposes, requires the most withdrawal; but the water is returned – albeit at a warmer temperature. Municipal and rural domestic withdrawal and consumption account for less than 10 per cent of the western total. Manufacturing is a substantial withdrawer of water for processing, cooling, and waste discharge (particularly the pulp and paper industry); not much of it is consumed, however. Western Canada accounts for about 30 per cent of Canada's water withdrawal and for almost 70 per cent of its water consumption, mainly because agricultural irrigation and oil and gas production are centred in the western provinces.

The Canadian West is water-rich, but this does not enable it to avoid water problems. Water must be available at the right place, at the right time, and of the right quality. Five western drainage basins are supposedly already short of water or may become so by the year 2000: the Okanagan, Milk River, North

Table 9-3

Withdrawal and Consumption of Water in the Prairie Provinces, British Columbia, and the West, Canada, 1980

	Prairie provinces		British Columbia		The West[1]		Canada	
	Amount used daily	Proportion of total used	Amount used daily	Proportion of total used	Amount used daily	Proportion of total used	Amount used daily	Proportion of total used
	(Millions of litres)	(Per cent)	(Millions of litres)	(Per cent)	(Millions of litres)	(Per cent)	(Millions of litres)	(Per cent)
Withdrawal:								
Municipal and rural domestic	1,568	6.1	1,468	15.0	3,036	8.6	11,310	9.4
Manufacturing	2,096	8.2	5,642	57.8	7,737	21.9	38,927	32.4
Mining	2,418	9.5	277	2.8	2,696	7.6	4,441	3.7
Agriculture	5,883	23.1	1,568	16.1	7,451	21.1	8,296	6.9
Thermal	13,556	53.1	805	8.3	14,361	40.7	57,088	47.6
Total[1]	25,521	100.0	9,760	100.0	35,281	100.0	120,062	100.0
Consumption:								
Municipal and rural domestic	391	7.1	283	20.7	674	9.8	1,993	18.7
Manufacturing	150	2.7	227	16.7	377	5.5	1,545	14.5
Mining	1,945	35.2	109	8.0	2,054	29.8	2,263	21.3
Agriculture	2,946	53.2	736	54.2	3,682	53.4	4,409	41.5
Thermal	102	1.8	6	0.4	108	1.6	428	4.0
Total[1]	5,534	100.0	1,361	100.0	6,895	100.0	10,638	100.0

1 The following drainage basins are included in Western Canada: Fraser, Okanagan, Columbia, Pacific Coastal, Peace-Athabasca, Milk, Churchill, Nelson, North Saskatchewan, South Saskatchewan, Red-Assiniboine, and Winnipeg.

SOURCE H. D. Foster and W.R.D. Sewell, *Water: The Emerging Crisis in Canada*, Canadian Institute for Economic Policy (Toronto: CIEP, 1981), Appendix Tables 3 to 6.

Saskatchewan, South Saskatchewan, and Red-Assiniboine (Table 9-4). The projected-use figures cited are based on very simple trend projections and linear extrapolations of past experience.[6] Also, projected use is estimated on the assumption that the current economic and institutional regimes will prevail up to 2000 and beyond, and that water will continue to be regarded as a free good – that is, water charges will reflect only the cost of water distribution, not the scarcity value of the water itself.

This is important because U.S. experience indicates that industrial water withdrawal is quite responsive to price, with increases leading to recirculation and more effective water use. Domestic use is also price-sensitive. This can be seen by comparing use in Calgary, where a flat rate is charged for water, with that in Edmonton, where water use is metered and charges are levied according to quantity used. Households in Calgary are alleged to use some 40 per cent more water than those in Edmonton. A similar difference exists between Regina (flat rate) and Saskatoon (metered).

Turning to the individual basins, we find that in the Okanagan Basin, consumption is now about one-third of the reliable minimum monthly flow and is projected to rise to about one-half by the year 2000. While average daily withdrawal is projected to exceed the stringent reliable-monthly-flow criterion before 2000, intelligent management policies can avoid a crisis. The Okanagan Basin Implementation Board recently concluded that "under good water management there is enough water in the basin to supply all projected withdrawals ... within the foreseeable future."[7]

The Milk River Basin is characterized by large ranches and extensive grazing. Water is used mainly for irrigation of hay crops or forage; therefore consumption is relatively high, compared with the reliable annual flow. Fortunately, irrigation occurs in the summer months when river flows are more plentiful. Increased storage in the Milk River Basin would be possible, but a preliminary benefit/cost study indicated a benefit/cost ratio of slightly below unity.[8] The question for the Milk River Basin is not whether there is a water problem but whether irrigating agriculture with free water is in the social interest, and whether water is being put to best use when irrigating land for forage and grain rather than specialty crops.

Table 9-4

Projected Supply, Withdrawal, Consumption, and Agricultural Use of Water from the Potentially Water-Scarce Drainage Basins of Western Canada, 1980-2000

	Supply[1]		Use					
	Reliable annual flow	Reliable minimum monthly flow	Total daily withdrawal		Total daily consumption		Agricultural use	
			1980	2000	1980	2000	1980	2000
	(Millions of litres per day)							
Drainage basin:								
Okanagan	4,637	1,100	850	1,309	355	555	318	477
Milk River	382	-	732	1,582	104	160	100	150
North Saskatchewan	15,093	1,809	10,579	24,721	850	1,729	91	132
South Saskatchewan	12,502	2,982	7,119	11,660	3,287	5,281	2,564	3,814
Red-Assiniboine	2,864	341	3,869	8,469	344	569	118	177

1 "Reliable annual flow" is defined as the flow that would be available 90 per cent of the time, or in 9 out of 10 years; "reliable minimum monthly flow" is the lowest monthly flow experienced in 10 years. All flow data reflect the effects of natural and artificial storage.

SOURCE H. D. Foster and W.R.D. Sewell, *Water: The Emerging Crisis in Canada*, Canadian Institute for Economic Policy (Toronto: CIEP, 1981), Appendix Tables 3 and 4.

In the North Saskatchewan Basin, consumption is projected to rise almost to the reliable monthly flow by 2000. The main consumer from this basin is expected to be the heavy oil-producing industry, and the reliability of the water consumption projection is surrounded by the same uncertainty as that of heavy oil production. Coal and chemical product industries are also heavy users of water. The large amount of projected withdrawal is due to anticipated future additions to thermal power generation. Since water discharged from thermal plants is released at raised temperatures, which reduce the amount of dissolved oxygen and the absorptive capacity of water bodies, high withdrawal from the North Saskatchewan Basin may create pollution problems. The higher recirculation rates at power plants that use cooling ponds reduce water withdrawal but increase consumption because of evaporation. In this basin, water quality rather than quantity will constitute the problem. Emerging difficulties could be solved, or reduced, by imposing effluent charges on polluters.

Among the basins listed, the South Saskatchewan Basin is projected to be, as at present, by far the highest consumer of water; in terms of withdrawal, however, it is second to the North Saskatchewan Basin. Over three-quarters of the consumption is used for irrigation. Most of the irrigated area is used for grain and hay; and relatively little for specialty crops like sugar beets, pulses, potatoes, or vegetables, even though cereal grains and hay for fodder can also be grown under dryland conditions. Under the present system of levying water charges and allocating water licences, a water shortage exists in this basin. Appropriate pricing of irrigation water would avert shortages, as it would also in the Red-Assiniboine Basin, where current consumption also exceeds the reliable monthly flow and is projected to exceed it even more in the future. Improvement and rehabilitation of the existing irrigation system and reduction of summer fallow are the most efficient ways to increase water supply.

We conclude, therefore, that some reduction in the availability of water resources will slow western economic growth slightly, compared with the past. Water demand and supply management is needed, and the cost will constitute a mild growth-slowing force. Nevertheless, although "there are many challenges to be met and faced with respect to water availability ... a water crisis is not present or imminent."[9]

Water availability in western Canada can be increased in various ways. Perhaps the most important one is through the rehabilitation, improvement, and better utilization of irrigation projects. Many of the irrigation works are undersized, prone to seepage, and wasteful. Additional storage dams could increase water availability.

The question of dams, as well as that of diverting water from the water-abundant North, leads to the question: Who should pay? Such works are highly visible and therefore popular, because they benefit identifiable groups or industries. But the beneficiaries are not always willing, or even able, to pay for the

work necessary to make the additional water available, and it would be inequitable for the general taxpaying public to have to shoulder the burden. Thorough benefit/cost calculations are vital and all the more so because "[w]ater and water projects are typically a clumsy policy tool for redistributing either regional or personal income or wealth."[10] Ultimately it may become necessary to divert northern waters towards the South, but such a project would be expensive. Also the environmental effects of water diversion are controversial and difficult to assess. Water supply management is feasible but should be used in conjunction with demand management.

A major conservation technique, as yet largely unused, would be to treat water as a scarce economic good. This would mean that the owner of water resources (usually the government) would sell water to the highest bidder, provided that the highest bid covered at least the cost of storage and distribution and any purification, decontamination, and cooling of discharged water. Such a policy would direct water to its most valuable social uses and would induce water saving and recirculation, since water use is quite responsive to price. For instance, in the Canadian steel industry the average amount of water used per ton of steel produced is more than 40 times as high as that in the Kaiser plant in California.[11]

Bearing all of this in mind, water shortage need not be a restraining force on western economic development, and water pricing would reduce that possibility even further. Moreover, certain characteristics of water usage should be kept in mind when assessing the impact of the shortages that do exist. Irrigated agriculture, thermal power plants in eastern Saskatchewan and east-central Alberta, and heavy oil developments in the Cold Lake and Lloydminster area are the industries most exposed to water-related constraints. In most other industries, the availability of water plays a secondary role.

Recent studies indicate that even in the arid southwestern region of the United States, water need not be a constraint to economic growth.[12] The Canadian West is *relatively* richer in water than some western U.S. states. This constitutes an exploitable comparative advantage in selected branches of agriculture, as we indicated in Chapter 7. Often the complaint about water shortage indicates that there are more highly valued uses for the available water than agricultural irrigation or that the price of municipal water is being kept artificially low. In manufacturing, water costs are a relatively small proportion of total costs and have a very small impact on industrial-location decisions. This is even truer for the service industries.

Shortages – current and prospective – are nevertheless threatening enough to indicate that it is no longer economically efficient to regard water as a free good. Western growth will be helped by institutional recognition of this fact. Efficiency requires that the price of water reflect demand and supply conditions, including the return on capital invested and depreciation charges for eventual replacement. In current practice, water charges usually cover only distribution costs. In the irrigated areas of southern Alberta, farmers pay a flat fee of about $10 per acre for irrigation water, regardless of the quantity used. We recognize that raising water charges will be politically difficult, but we regard it as necessary. A block pricing scheme, in which initial units of water are priced low and the charges for successive blocks rise progressively towards the true scarcity value of water, is in place in the Australian state of South Australia and would be politically more acceptable. Therefore,

27 We recommend that the western provinces institute water charges and water-charging systems that are more in line with the scarcity value of water.

The most important regulatory power of the provinces over water use lies in the licence system. In effect, this is a first-come, first-served system, even though in principle there are ways to reassign water from lower- to higher-valued use upon appeal to, and at the discretion of, the minister responsible and upon payment of compensation to the first-come, but lower-valued, user. The highest-valued use in Alberta, for example, is for domestic purposes, followed by municipal, irrigation, industrial, water power, and other uses. The transfer mechanism is necessarily cumbersome and inflexible.

The present system could be modified to facilitate the reallocation of water to higher-valued uses. Elements could be introduced into the market mechanism whereby holders of water rights could sell them to other users, subject to the veto power of a water management authority and provided that changes in the points of diversion or adverse downstream effects will not cause undue harm. Such a reform in water rights could be introduced initially within specified areas – perhaps solely among irrigators. Eventually the system could be extended to include sales between areas and between uses. An incidental side-benefit of such a system would be that it would indicate the scarcity value of water and thus be helpful in benefit/cost calculations for proposed dams and canals. Therefore,

28 We recommend that the western provinces reform the laws governing water rights so as to facilitate the sale of such rights between users of water, subject to the veto of a provincial water management authority.

In our discussion we have emphasized the use of water as an input to economic activity. Water, however, has many other important uses as well. For instance, instream uses of water include recreation, boating, aesthetic enjoyment, navigation, and scientific study. Their value increases with economic growth and with the rise in the material standard of living, even though such value is difficult to measure. Amenity services have public-goods characteristics and provide extra market benefits. There is, therefore, a legitimate role for government to protect the public interest. Therefore,

29 We recommend continued government vigilance to protect the quality of the water bodies, and in particular the imposition of effluent charges in line with the scarcity value of water.

Conclusion

At the beginning of the chapter we said that the fishery and tourism, though presently of minor importance to the West, were considered by many westerners to have significant growth potential. For the fishery, there is indeed great scope for reducing the cost of the catch, and the social profitability of the fishery could be much enhanced. But the total value of fishery output is unlikely to rise very much, and most of the benefits of the lower costs will accrue to Canadians in general rather than to westerners in particular. Consequently, improvement in the western fishery, though highly desirable, would not noticeably stimulate faster economic growth in the West.

Tourism is a highly competitive industry. Our analysis shows that the western provinces are holding their own, but there is no reason to believe that growth will be much faster than in the past. While nothing is impossible, it does not seem, given the relatively small segment of the tourist industry that caters to out-of-province visitors and even given sanguine expectations about growth possibilities, that anything beyond a minor contribution could be made to future growth by the tourist industry.

Concerns about the possible effect of water shortages in inhibiting western growth seem to be exaggerated. There are some trouble spots, but they are not widespread; and straightforward policy remedies are available – mainly through the occasional imposition of a charge for water. Water exports are a possibility but not for at least a generation.

10 Transportation

Transportation plays a crucial role in economic development. The importance of this role in the western provinces is, however, sometimes misunderstood. In this chapter, we look at the significance of transportation modes in the West and discuss some of the apparent problems in the relationship between transportation and the economic development of the West.

Traditionally, one of the most important sources of economic growth is specialization and the division of labour, and the degree of division of labour depends on the size of the market, which in turn expands as transportation costs decline.[1] The inhabitants of isolated manors and monasteries in the Early Middle Ages, when transportation was inefficient and expensive, led a very diversified economic life, producing their own food and clothing, beer and sacramental wine, construction timber, and the carved capitals of the columns in the cloisters. They also had a very low standard of living. The development of transportation routes – first along the rivers and ocean coastlines, then on roads – resulted in increased markets, specialized production, and increasing economic welfare.

High transportation costs did not mean the complete absence of specialization. For example, ores had to be mined where nature provided them, and high transportation costs required that the metals be refined as close to the mines as possible. But low transportation costs were a powerful force for promoting specialization. Today, the effect of low transportation costs on specialization is illustrated by the concentration of industries in which such costs are relatively low compared with the value of the product. California's Silicon Valley for the computer industry, Boston's Route 128 for electronics, and the Faubourg Saint-Honoré in Paris for haute couture are outstanding examples.

Before the construction of the Canadian Pacific Railway, the population of the Canadian West was very small – a mere 109,000 in 1871[2] – and the settlements were concentrated along waterways, in the Red River Valley, and along the Pacific Coast.[3] The Prairies were empty because, in addition to their harsh climate, they lacked transport facilities. The building of the railway was a prerequisite for the settlement of the West. The Prairies, being unsuitable for subsistence farming and deficient in timber and fuel, were forced to concentrate on a cash crop – wheat. "The vital inbound movement of supplies and the outbound movement of grain could only take place on the railway."[4] The radical lowering of transport costs as a result of changing from horse-drawn carts to the railway encouraged the settlement of the West and its specialization in grain production. But, although the availability of transportation was a prerequisite of western settlement, it was, by itself, not the only one. The high real price of grain, the settling of the sub-humid regions of the Dakotas, and the development of dry farming techniques were some of the other important conditions.

The impetus for the construction of the Canadian Pacific Railway was political: many feared that without a railway the Canadian West would fall into the orbit of the United States, as the U.S. railways gradually expanded northward. There was no adequate population base or freight traffic to provide economic justification for railroad building. Large-scale migration to the West did not begin until 10 years after the completion of the CPR line. This is why, in contrast to densely populated England, a large subsidy for building the railway was necessary. The railroad was in a monopoly situation, in the sense that there was no practical competing mode of transportation on the Prairies. In the predominating spirit of laissez faire it had virtually complete freedom in setting freight rates. But, without railroads, there would have been no settlement of the West before the First World War and no Canada as we know it.

The Importance of Transportation

Canada is a country of vast distances and sparse population, with 95 per cent of its 24 million inhabitants spread over a strip of land 7,000 kilometres long and 300 kilometres wide. Thus transportation would be expected to play a relatively important role in the life of the economy.

One way to measure the magnitude of this role is to express the gross domestic product (GDP) of the Canadian transportation industry as the percentage of total Canadian GDP.[5] We shall designate this concept as "the transportation intensity" of the Canadian economy. Prior to 1944, Statistics Canada published only a combined estimate of the GDP of the transportation, storage, and communications industries. The GDP of these industries accounted for

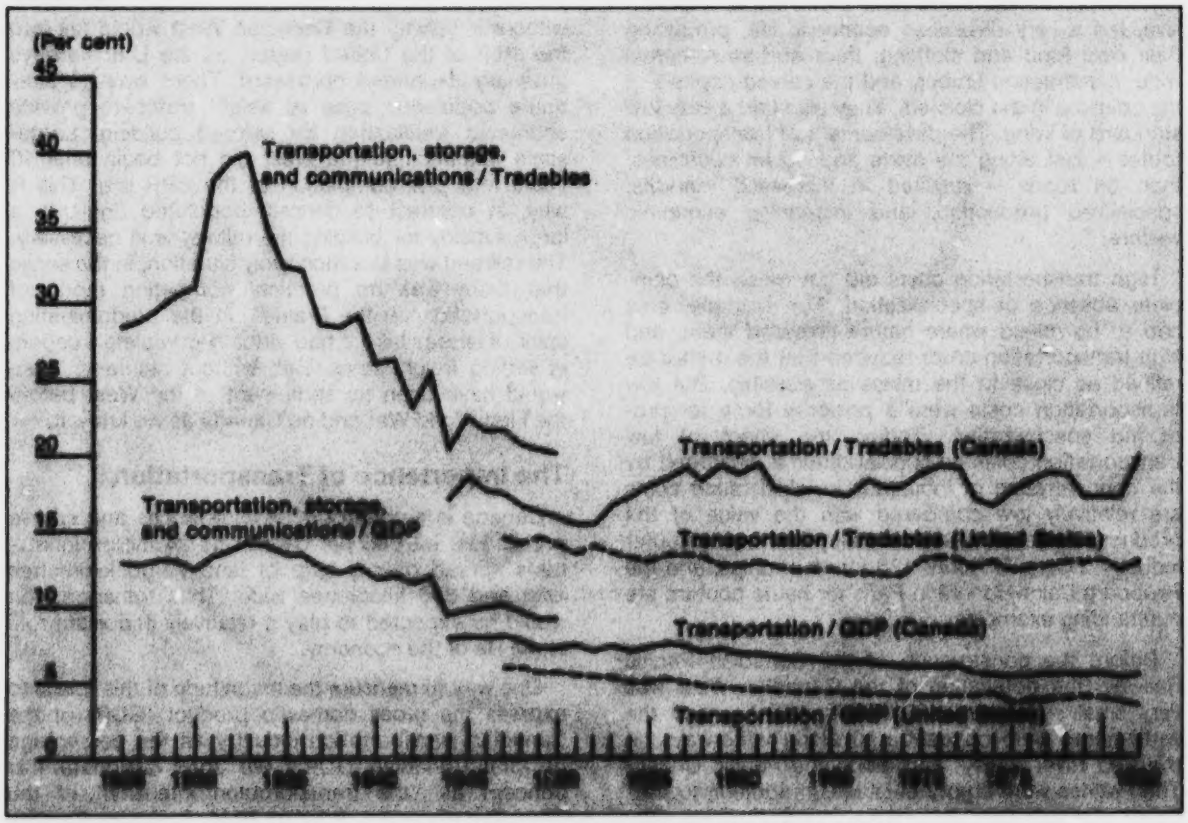
some 13 to 14 per cent of total GDP in the late 1920s and the first half of the 1930s, then it gradually declined to 9.2 per cent by 1950 (Chart 10-1). Transportation itself accounted for 7.3 per cent of Canadian GDP in 1950; it slowly but persistently declined, with minor fluctuations, to 5.2 per cent in 1981.

The historical pattern of the transportation intensity of the total Canadian economy may, however, be misleading. The products of agriculture; forestry; fishing, hunting, and trapping; mines, quarries, and oil wells; and manufacturing, which we designate tradables, are transported. But in all industrially developed countries the importance of these products has been declining relative to the output of the service industries, which is not transported. Thus the transportation intensity of tradables may be a more significant indicator than overall transportation intensity. The transportation intensity of Canadian tradables fluctuated between 15.5 per cent in 1951 and 19.3 per cent in 1971, without any discernible trend. In recent years it has stood around 17 per cent. Canadian transportation intensities are about 40 per cent higher than their counterparts in the United States.

For individual regions of Canada, transportation intensities can be derived only from 1961 on.[6] The transportation intensity of the total RDP of eastern Canada has been steady, around 4 per cent; that of the West has varied between 6 and 8 per cent, with a

Chart 10-1

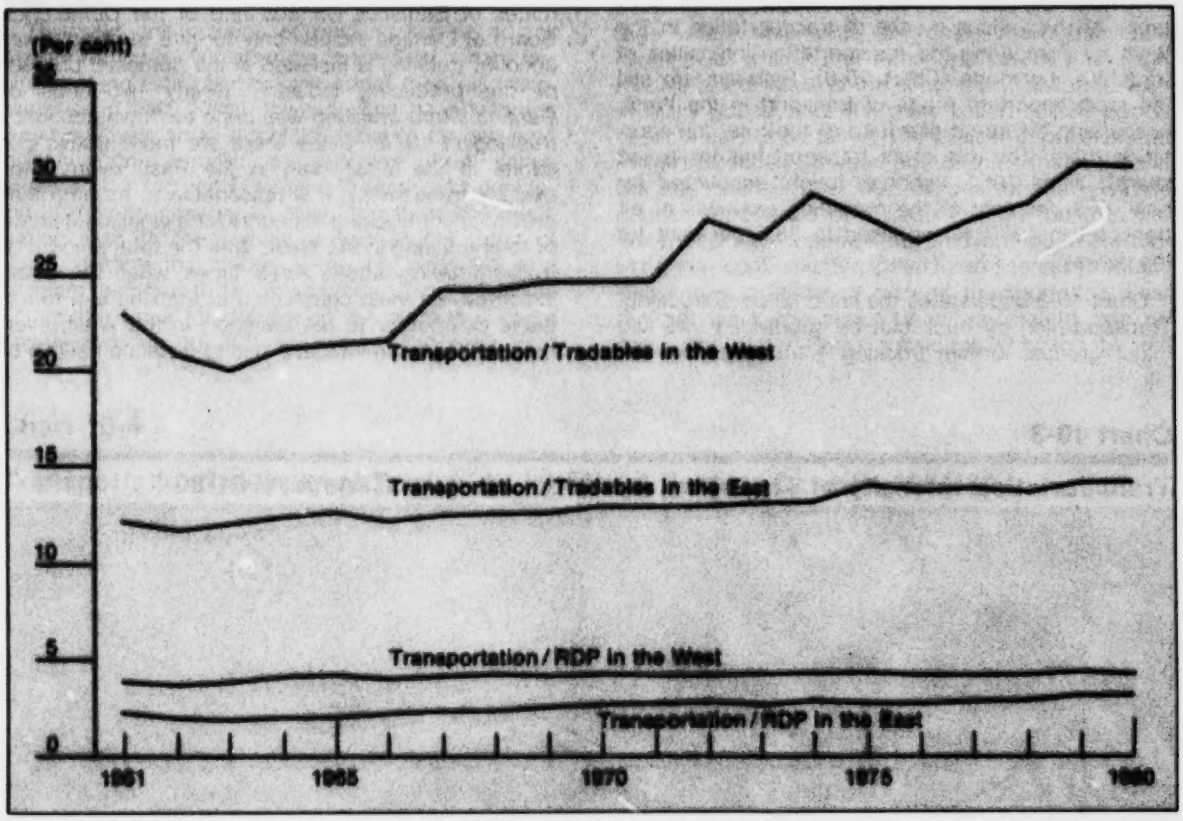
Transportation Intensity in Canada Compared with That in the United States, 1926-82



NOTE Tradables are defined as agriculture, forestry, fishing, mining, and manufacturing products.
SOURCE Based on data from Statistics Canada and from U.S. Department of Commerce, *Survey of Current Business*, July 1983.

Chart 10-2

Transportation Intensity in the West Compared with That in the East, Canada, 1961-80



SOURCE Based on unpublished data from the Conference Board of Canada and from their publications *The Provincial Economies: 1961-1980 Data*, and *A Supplement to the Quarterly Provincial Forecasts*, 1981 Edition.

noticeable upward trend (Chart 10-2). In recent years the transportation intensity of total western RDP has been some 80 per cent higher than that of the East. This tendency is even more pronounced if we consider only the transportation intensity of tradables, which increased from about 12 to 14 per cent in the East between 1962 and 1980 and from 23 to 31 per cent in the West. In the 1970s the transportation intensity of western tradables was more than twice as high in the West as in the East, though this figure is somewhat misleading, as will be seen. Nevertheless, these data confirm the casual impression that transportation plays a larger role in the economic life of Canada than in that of the United States and a larger role in the West of our country than in the East.

The Importance of the Various Modes of Transportation

Until the arrival of the internal combustion engine, rail transport was by far the predominant mode of transportation in the West, with water transport a distant second. The arrival of the automobile wrought major changes; by 1950, trucking accounted for 10 per cent of the operating revenues of all Canadian domiciled carriers engaged in for-hire transportation. The second Turgeon Report of 1955 acknowledged that highway competition had forced the railways to cut many freight rates, and in 1961 the McPherson Commission decided that intermodal competition was the best way to ensure an economic, efficient, and

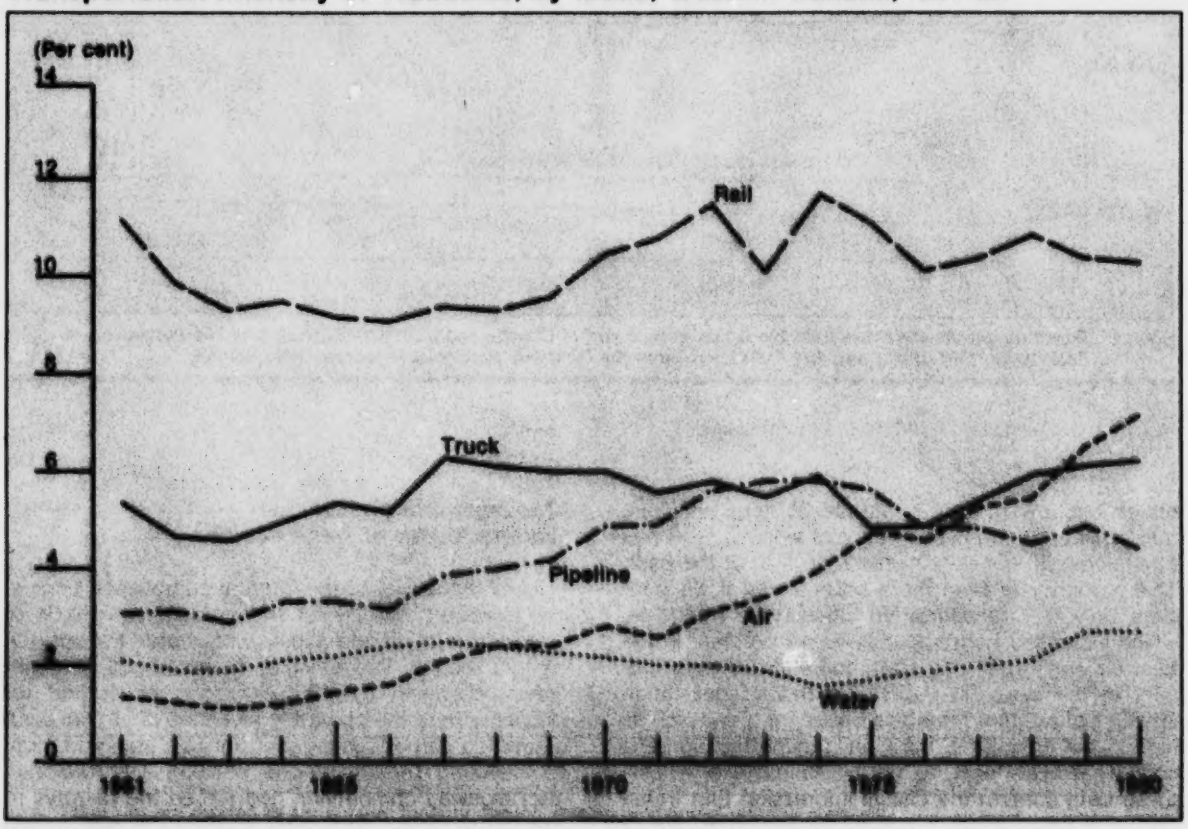
adequate transportation system for Canada. This principle was adopted in the National Transportation Act of 1967.

We can gain an impression of the relative importance of the various modes of transportation in the West by comparing the transportation intensities of tradables, by mode (Chart 10-3). Railways are still the most important mode of transport in the West, accounting for about one-third of the total transportation there. The role of air transport has increased sharply since 1961, although freight accounted for only 17.3 per cent of the operating revenues of air transport in 1980, as opposed to 88.5 per cent for the railways.

Chart 10-3 understates the importance of trucking. Transportation by truck can be subdivided into two major groups: for-hire trucking – trucking done for customers by companies specializing in transportation; and own-account trucking – delivery by businesses of their own products to customers, traders, or their own warehouses. The transportation estimates of Statistics Canada and of the Conference Board of Canada include only for-hire trucking; own-account trucking is included in the domestic product of the producing industry. Nearly two-thirds of Canada's total trucking was done as "own-account" trucking in 1974.[7] Since there are more trucks per capita in the West than in the East, even if we exclude farm trucks, it is reasonable to assume that own-account trucking accounts for a significant share of total trucking in the West. With the total amount of trucking being about three times what the chart indicates, we must conclude that trucking is a formidable competitor to rail transport in the West, even though the strong increase in long-distance hauling of

Chart 10-3

Transportation Intensity of Tradables, by Mode, Western Canada, 1961-80



SOURCE Based on unpublished data from the Conference Board of Canada and from their publications *The Provincial Economies: 1961-1980 Data*, and *A Supplement to the Quarterly Provincial Forecasts*, 1981 Edition.

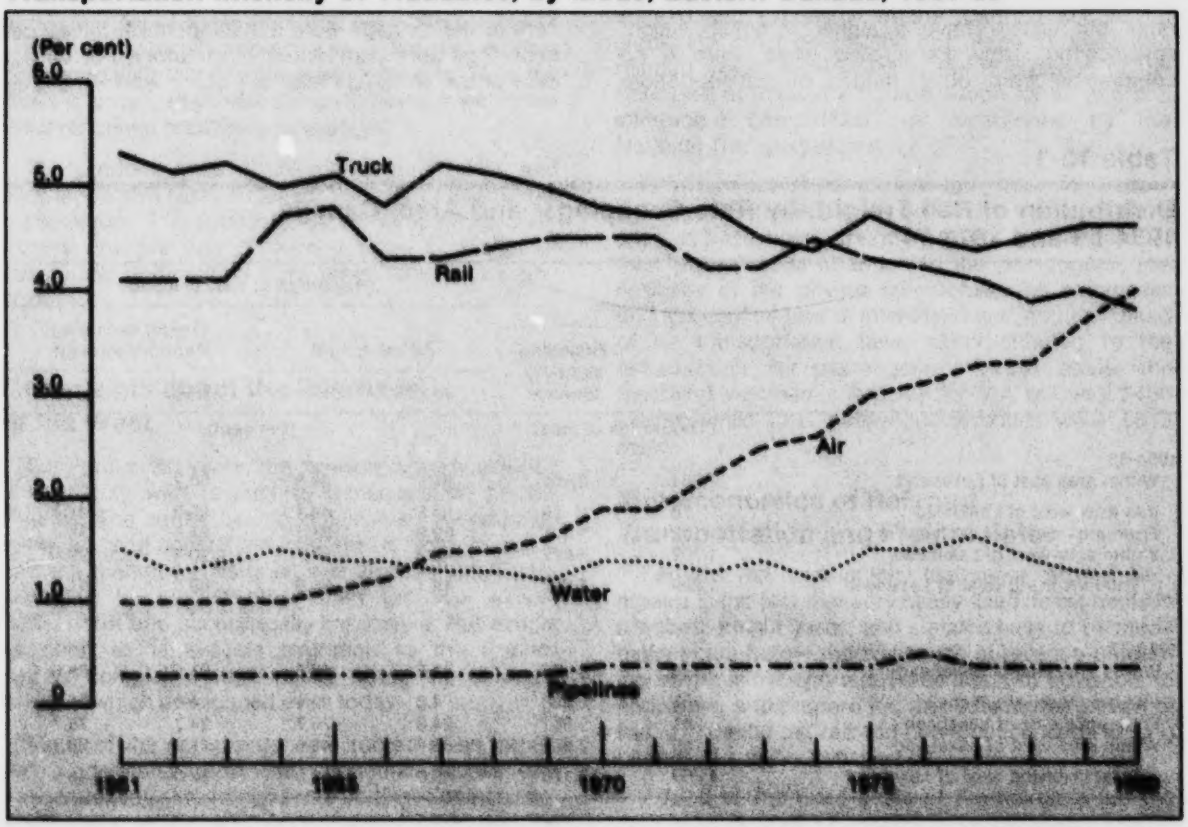
bulky, low-value commodities and the substantial increase in railroad efficiency have stabilized, if not improved, the position of the railways relative to trucking.

This said, the position of trucking relative to rail transportation is even stronger in the East, where for-hire trucking alone is more important than rail transportation (Chart 10-4). Trucking has an advantage when relatively small quantities have to be delivered quickly from supplier to customer and where repeated loading and unloading is costly and damaging. It may be cheaper to truck directly to the destination than to the railway station at the point of origin, where the goods must be reloaded into boxcars, shipped to the destination, and transferred to another truck for delivery to the customer. For a distance of up to 800 kilometres, the total cost advantage, including that of time saved, is generally thought to favour trucking; beyond that, to favour rail.

Railway transportation has some advantages over trucking, especially in the West. It has a cost advantage where shipments are going more than 800 kilometres; where the transportation cost is high relative to the value of the commodity, as in the case of bulky goods; and where the speed of transport is of secondary importance. The sparser population and longer distances between population centres than in the East are some of the reasons for the relatively greater importance of railroad transportation in the West. The West's comparative advantage in producing grain, coal, sulphur, potash, and forest products also works in favour of railroad transportation. Last but not least, the statutory railway freight rate on grain (the Crow Rate) subsidizes shipping by rail

Chart 10-4

Transportation Intensity of Tradables, by Mode, Eastern Canada, 1961-80



SOURCE Based on unpublished data from the Conference Board of Canada and from their publications *The Provincial Economies: 1961-1980 Data*, and *A Supplement to the Quarterly Provincial Forecasts*, 1981 Edition.

rather than by truck, by keeping the rail freight rate below the cost of transportation. Thus the location of natural resources, absence of waterways, demography, and agricultural policy have all rendered rail transportation more important in the West than in the East.

This relative importance is also reflected in the freight rates that the railways are able to charge. These are customarily grouped under five headings: class; commodity, noncompetitive; commodity, competitive; agreed charges; and statutory grain rates. These names, prescribed in the Railway Act, are not very useful indicators of the amount of competition that the railways face.

Class rates are published under Canadian Class Rate tariffs and apply in the absence of lower commodity or competitive rates. They are stated in cents per 100 pounds, in blocks of 50 miles. They can be regarded as ceiling rates, and they applied to a mere 0.25 per cent of all ton-miles in 1977.

Commodity noncompetitive rates apply to specified bulky commodities. They are lower than the class rates but usually have a higher minimum weight specification. They are applied when there is no competition from other modes of transportation; however, the rate must be sufficiently low to enable the producer to compete in the Canadian and world markets. In this sense, the expression "noncompetitive" is something of a misnomer.

Commodity competitive rates are issued to meet competition from other modes of transportation. They are generally lower than the noncompetitive rates for the same commodities.

Agreed charges apply to contractual agreements between the railways and shippers, in which case lower rates are offered if the shipper guarantees a specified percentage of his traffic during the contract period. Any shipper able to meet that condition may become a party to an agreed charge.

Statutory grain rates are rates set by Canadian law. They apply to shipments of certain specified grains and grain products.

Table 10-1 compares the percentage distribution of freight in various parts of Canada under various rate groupings. In the area east of the Lakehead during the 1954-58 period, the rates for about 60 per cent of the tonnage were noncompetitive; for 40 per cent, they were competitive or statutory. For 44 per cent of the shippings into, out of, or within the area

Table 10-1

Distribution of Rail Freight, by Rate Groupings[1] and Area, Canada, 1954-58 and 1973-77

	Freight		Proportion of total shipped			
			All rail freight		Freight excluding statutory tonnage	
	Total	Excluding statutory tonnage	A+B	C+D+E	A+B	C+D
	(Thousands of tons)		(Per cent)			
1954-58						
Within area east of Lakehead	2,551	2,551	60.2	39.8	60.2	39.8
Into area west of Lakehead	78	78	55.9	44.1	55.9	44.1
From area west of Lakehead	109	106	62.9	37.1	64.6	35.4
Within area west of Lakehead	1,702	1,022	42.3	57.7	70.4	29.6
Total involving west of Lakehead	1,889	1,207	44.1	55.9	69.0	31.0
1973-77						
Within area east of Lakehead	3,170	3,170	31.5	68.5	31.5	68.5
Into area west of Lakehead	258	258	4.6	95.4	4.6	95.4
From area west of Lakehead	261	261	24.3	75.7	24.3	75.7
Within area west of Lakehead	3,750	2,651	50.4	49.6	71.3	28.7
Total involving west of Lakehead	4,269	3,170	46.0	54.0	62.0	38.0

1 Rate groupings include A - class rates; B - commodity rates, noncompetitive; C - commodity rates, competitive; D - agreed charges; and E - statutory grain rates.

SOURCE Canadian Transport Commission, *Waybill Analysis, Carload All-Rail Traffic: Historical Summary, 1949-1977* (Ottawa: CTC, 1983).

west of the Lakehead, the rates were noncompetitive; for 56 per cent, competitive. If we exclude statutory grain, the figures for the West change to 69 per cent noncompetitive and 31 per cent competitive. No shipping under statutory rates occurs east of the Lakehead. On the whole, relatively more goods were shipped under competitive and statutory rates to, from, and within, the West than within the East, but if we exclude statutory grain, the East enjoyed more competition. Furthermore, after the exclusion of grain, competitive rates applied to 44 per cent of the tonnage into the West, 35 per cent of the tonnage from the West, and 30 per cent within the West.

The situation changed substantially between the late 1950s and the mid-1970s. East of the Lakehead, there was an almost exact reversal of the 1954-58 distribution; 32 per cent and 68 per cent of the tonnage was shipped under noncompetitive and competitive freight rates, respectively. West of the Lakehead, for freight traffic excluding statutory grain, the shift to competitive rates was less impressive. While competitive rates applied to almost all shipments *into* the area west of the Lakehead and to three-quarters of those *from* that area, the volume of such inter-area shipments was relatively modest compared with that of intra-area shipments. Thus the share of shipments under competitive rates within the West remained practically unchanged.

The predominance of shipments under class and noncompetitive rates indicates the lack of intermodal competition. A preponderance of competitive commodity charges and of agreed rates is a sign of substantial competition from other modes of transport.

Complaints about the Railroads in the West

For the first 50 years, the railways virtually enjoyed a monopoly with respect to transportation on the Prairies. The settler had to obtain fuel, construction materials, and agricultural implements from far away, and the market for his grain was also distant. Transportation by modes other than rail was almost nonexistent and economically impossible. But almost as soon as large-scale migration to the Prairies began, complaints were raised about the railways, many of which are echoed even today.

Many of the complaints were rooted in an imperfect understanding of the economic causes and consequences of rail freight rate setting. For instance, some in the western provinces have claimed that the "unnecessarily" high freight rates on manufactured goods being transported there from the central provinces have kept the cost of living high in the West. Somewhat inconsistently, others have argued that higher transportation rates on manufactured goods from the West to the East are obstacles to diversifying the economies of the Canadian West. The western provinces have certain natural advantages in the production of grain, forest products, and minerals. The demand for, and price of, such products generally tends to fluctuate more strongly than those of highly manufactured products, and some western spokesmen claim that this imparts instability. In their opinion, diversification into manufacturing is desirable. The question of the influence of freight rates on the ability of western manufacturers to compete is a very important one, to which we shall return.

There have also been complaints that the quality of railroad freight service is unsatisfactory and is, indeed, inferior to the quality of truck transportation.[8] It is true that a worrisome decline in the quality of service has been observed in the transportation of grain, for which the statutory freight rate has been, for more than 20 years, lower than the variable cost of transporting grain, not to speak of the cost of the upkeep and expansion of the roadbed and rolling stock. For other goods, the best hope for improving railroad freight service lies in the application of the principles of adequate compensation for service and intermodal competition, as established by the National Transportation Act.

A further set of complaints surrounds the discontinuation of passenger services. But this is partly a case of passengers abandoning the railroads rather than the railroads abandoning the passengers. The flexibility of the private automobile, the cheapness and frequent service of intercity buses, and the speed of air transportation have all contributed to the reduction in rail passengers. In 1981 alone, the federal government's subsidy for VIA rail was $400 million, while total passenger revenues were $612 million.

The Economics of Railroad Transportation and Freight Rates

Perhaps the most crucial feature of railroad economics is the fact that very heavy fixed investments in roadbed, freight yards, and stations have to be made many years before the first tonne of revenue-producing freight is transported. Since it is also advisable to anticipate, and prepare for, any substantial growth of traffic in the future, railroad construction leads to long periods of surplus transport capacity.

Added to the fixed costs of the railroads are the variable costs of operation. It is no easy task to define and measure variable costs in the railroad industry, and experts often disagree on the details.

The cost of transporting an additional kilogram of freight is trivial; adding another freight car to a train costs little; the cost of running an additional train though is no longer negligible. As long as there is surplus capacity, additional freight will reduce average costs, provided that the unit variable cost is not increasing. Calculations based on methods recommended by the McPherson Commission indicate that 70 to 75 per cent of the total expenses of the CPR and CNR are variable.[9]

Railways have to contend with two types of competition. One type is that presented by other modes of transportation – trucks, ships, airplanes, and pipelines; the other is market competition.

As an illustration of market competition, let us assume that Japanese steel widgets can be delivered to Vancouver at $100 a widget. Assume further that widgets can be produced in central Canada at $85 f.o.b. and that the average transportation cost to Vancouver is $20. At $105 the central Canadian widget is not competitive; thus no shipment will occur. If the railroad can reduce the rate to $15 or less, the Canadian widget will become competitive, and railroad traffic in widgets will ensue. If the reduced rate more than covers the variable cost, the fixed cost of the railroad will be spread over more traffic, and the profit of the railroad will increase.

Market competition may induce the railroad to accept special rates as long as they cover, or more than cover, variable costs. In such a case the freight rate of widgets to Vancouver may be lower than to, say, Edmonton, leading to the frequently discussed "long-haul/short-haul" problem. In the early 1950s, the competitive rates for shipping certain commodities to Vancouver were considerably lower than those to Alberta. Parliament then amended the Railway Act so as to limit the freight rate to intermediate points to no more than one-third higher than the rate to the more distant point. Thereupon the railways chose to abandon the Vancouver traffic of these commodities rather than lower the rate to Alberta. Later they published agreed charges to Vancouver, and the validity of this tactic was upheld by the Canadian Transport Commission, despite complaints from Alberta. By the time the Mc?herson Committee hearings were held, counsel for Alberta, acquiescing in the CTC decision on agreed charges, referred to the long-haul/short-haul issue as a dead duck and hoped that no one would try to dig up the corpse. But it was dug up – at the Western Economic Opportunities Conference in 1973, when a study of the problem was commissioned. The results are discussed in a later section.

Like all other businesses, the railroads must earn enough total revenue to cover total expenses – including the necessary remuneration of capital. If they do not, they will go bankrupt or will have to be subsidized by government – that is, by the taxpayers. It is a strongly argued proposition in economics that the most efficient use of a nation's economic resources requires that the price set for each good and service be equal to the cost of producing an additional unit of the goods and services (the marginal cost) in question.[10] But when the marginal cost is lower than the average cost, as is the case when railroads have substantial unused capacity, either the railroads must abandon marginal cost pricing or the government must relieve them of the fixed costs.

In practice, no railroads, Canadian or foreign, privately owned or nationalized, charge on the basis of marginal costs. Instead, they practise "value of service" pricing – also called "what the traffic can bear." This policy is also equivalent to "not charging what the traffic can *not* bear." In effect this system sets freight rates according to the shipper's and/or receiver's ability and willingness to bear the transportation cost. It is, after all, in the railroad's interest that the shipment take place. If the receiver can easily turn to local suppliers, then he will resist absorbing high transportation rates. If the distant supplier has to contend with a rigid cost structure, then he will be unable to bear high transportation rates. Thus the joint effect of the demand for, and supply of, the products shipped will determine the cost and quantity shipped and who bears the cost of transportation. On the whole, higher-priced commodities are charged higher freight rates. For instance, agricultural products – excluding statutory grain and grain products – paid 1.82 cents per ton-mile in 1980; mining products, 2.17 cents; forest products, 3.34 cents; and manufactures and miscellaneous products, 4.14 cents.[11]

In 1967 the National Transportation Act incorporated some of the most important recommendations of the McPherson Commission. It gave the railroads freedom to set freight rates, with two exceptions: it decreed that no freight rate shall be lower than the variable cost of the shipment, which prevents the railroads from engaging in unfair competition against alternative modes of transport; and it set an upper limit on the freight rate, provided the shipper commits himself to sending all his goods by rail. This "captive shippers" clause protects only shippers who have no feasible alternative to railroad transportation.

One important recommendation of the McPherson Commission was not incorporated into the National Transportation Act: the Commission recommended that should Parliament, in its wisdom, decide that certain freight rates should be set below variable

cost, the railroads should be subsidized to compensate for the shortfall. This recommendation had particular significance for grain shipments, because as far back as 1961 it was obvious that the statutory freight rate on grain – averaging about half a cent per ton-mile – did not cover the variable cost of transportation. With the passage of time, with the high inflation rate of the 1970s, and with increasing grain production, the statutory freight rate on grain (the Crow Rate) threatened to become the most important transportation problem in the West.

The Statutory Grain Rate

For the first 10 years after the completion of the CPR line, immigration to the West was low; the world grain price was depressed; and rail grain shipments were almost static. The rail freight rate for grain shipped between Regina and the Lakehead in 1886 was equivalent to 33 cents per hundred pounds – 65 per cent higher than in 1983 – and declined gradually to 23 cents in 1893. In 1897 the federal government and the CPR concluded an agreement under which the Company was to construct a line from Lethbridge, through the Crow's Nest Pass, to Nelson, British Columbia. The railway received a subsidy of $3.4 million; it committed itself to reducing the freight rate on "settlers' effects" being moved from central Canada to the West and, what proved in the long run to be even more important, on grain and flour moving eastward to Fort William and Port Arthur. The new, reduced rate, the "Crow Rate," was 20 cents per hundred pounds from Regina to the Lakehead.

The tremendous immigration wave of the late 1890s and early 1900s resulted in a large increase in freight traffic. Evidently, the Crow Rate was profitable, because in 1901 Manitoba and Saskatchewan negotiated an even lower rate with the Canadian Northern Railway – equivalent to 18 cents between Regina and the Lakehead – and the CPR followed suit. This rate remained in force until 1918, when wartime cost increases led the federal government to suspend the Crow agreement. The grain rate increased, peaking at 32.5 cents in 1920, followed by weakening world grain prices, which forced a reduction to 30 cents in 1921. In 1922 the Crow agreement was reinstated, and the rate set by statute at 20 cents per hundred pounds prevailed until 1983. The application of the Crow Rate was gradually extended to cover grain shipments to other ports. Since 1927, Crow-related rate scales have applied to grain shipped to the west coast and since 1931 to that shipped to Churchill, Manitoba.

Along with the problems of the Crow Rate, the development of the branch line system caused difficulties for the railroads. In 1885, Canada's railroad network consisted of 17,337 kilometres of track. After the completion of the first Canadian transcontinental line, the CPR began to develop its branch line network; other railroad companies were founded, and a veritable race in branch line construction followed. By 1932, the Canadian track mileage had increased to 68,250 kilometres. In the meantime the Grand Trunk and the Grand Trunk Pacific Railways had gone bankrupt and had been consolidated with other privately owned and government-owned lines into the Canadian National Railways.

The Great Depression and the concomitant reduction of freight traffic increased the difficulties of the railways still further. The business recovery of 1933-39, and the war years, witnessed an increase not only in railway traffic, but also in the costs of the railway companies. In addition, the Crow Rate was gradually extended to specified by-products of milling, distilling, and brewing, and to certain feed grain products. Requests for extension of the rate were usually based on the contention that because of the "low" Crow Rate, related agricultural products were subject to unfair competition. The original policy of decreeing a moderate but (for the railroads at that time) still profitable freight rate for export grain had begun to have completely unforeseen consequences. These led to further administrative regulation of freight rates.

For example, a firm established a canola crushing plant in Lethbridge, Alberta, during the 1950s. Soon afterwards the Alberta government requested that the statutory freight rate be applied to canola, and in 1961 that request was granted. This resulted in a deterioration of the competitive position of canola crushers in Alberta relative to those in the East. The Alberta government thereupon requested that the Crow Rate be extended also to canola oil and meal. The federal government began to subsidize the transport of canola oil and meal in 1976, but the subsidy was not sufficient to offset the disparity in freight rates favouring unprocessed canola.

After the Second World War, wage and other costs increased substantially, and the Board of Transport Commissioners granted a series of freight rate increases. The Turgeon Royal Commission recommended in 1951, however, that the freight rate for statutory grain remain fixed and under parliamentary control. Ten years later the McPherson Commission judged that the variable cost of grain transportation had risen above the Crow Rate. It recommended the abandonment of uneconomic branch lines; a federal government subsidy to cover the difference between the variable costs of shipping grain and the Crow Rate; and an eventual increase in the subsidy to cover a fair share of the constant costs as well.

The National Transportation Act provided for a subsidy for those uneconomic branch lines that were to be kept in operation in the public interest. Between 1971 and 1982 such subsidies amounted to the cumulative sum of $1.2 billion, but even this did not cover the losses incurred by grain transportation. The inflation of the 1970s continued to increase the unit cost of transporting grain, while unit revenues remained fixed by statute at the level agreed to in 1897 and later re-established in 1922. In addition, the quantity of statutory grain shipped rose from 13 million tonnes in 1958, the base year of the McPherson calculations, to 30 million in the 1981-82 crop year.

By 1976 it had become clear that the railways were losing money on shipping statutory grain. In that year the Snavely Report found that in 1974 the railroads had lost $105.5 million on shipping grain, even without a contribution to constant costs.[12] A more recent calculation by J. C. Gilson concluded that the loss in 1980 was $215 million, even after the inclusion in revenues of the $170 million received from the federal government as branch line subsidies and rehabilitation payments. After the addition of an appropriate contribution to constant costs, the loss amounted to $299 million.[13]

By then, the losses were mounting year by year and the situation was becoming unacceptable to the railroads; to the federal government, because its payments under the branch line subsidy and rehabilitation programs had more than tripled between 1974 and 1980; and to the national economy. Because the shipping of statutory grain was unprofitable, the railroads had let the grain gathering, handling, and transporting network deteriorate. Indeed, it is alleged that the Canadian Wheat Board had to forgo, or defer, more than a billion dollars' worth of grain exports over the 1977-79 crop years because of transportation difficulties. Uncertainty about the future of the Prairie grain economy increased, and the situation became unacceptable to the farmers as well. The result was that early in 1982 the federal Minister of Transport appointed Dr. J. C. Gilson to recommend, after consultation with the interested parties, a reform of the freight rate system for statutory grain.

Ideally, considerations of economic efficiency, fairness, and administrative simplicity suggest that any reform of that system should:

- Eliminate or substantially reduce the existing distortions in the composition of agricultural output. Grain prices are set in the international market. The farmer's receipt for grain is the world price minus the freight rate. If the freight rate is below transportation cost, the regime encourages the production of statutory grain on the Prairies and discourages the production of other agricultural products, such as cattle.
- Make "the best use of all available modes of transportation at the lowest total cost" (National Transportation Act, Section 3). Until 1984 farmers had paid less than cost for the transportation of grain, encouraging the use of rail transportation at the expense of truck transport.
- Ensure that "each mode of transport, so far as is practicable, receive compensation for the resources, facilities, and services that it is required to provide" (National Transportation Act, Section 3). The system in force until 1984 resulted in a revenue shortfall of $470 million in 1980 and would have led to considerably higher shortfalls in the future.
- Take into account that the federal government is prepared to bear a substantial part of the cost of grain transportation but that its resources are limited. The grain farmers will have to assume a bigger share of that cost.
- Include performance and service guarantees on part of the railroads.
- Be introduced gradually. The statutory freight rate that was in effect without interruption between 1922 and 1983 resulted in statutory revenue falling short of variable costs, at least from 1958 on. A subsidy of such long standing should not be suddenly withdrawn because the change would hit the beneficiaries of the subsidy in an unacceptable manner.
- Protect grain producers against exorbitant future increases in freight rates.
- Be revised at reasonable intervals.
- Be simple and easy to administer.

With these ideals in mind, Dr. Gilson conducted prolonged and detailed consultations with the parties involved. Interest ran high, for understandable reasons. The grain farmer's revenue is crucially influenced by the freight rate, because he receives the world price of his product minus the transportation charge. If this charge increases, his revenue and also his profit is likely to decline, assuming other costs are fixed. The value of his future net profit stream will be capitalized and reflected in the value of farm land, which is the farmer's chief asset. An increase in the grain freight rate is likely to reduce the value of land.

Not surprisingly Dr. Gilson found many differing interests. For instance, some argued that the grain freight rate should be raised to the compensatory level – which would cover the total cost of transporting grain and include an adequate return on capital. They also claimed that the equivalent of the benefit that accrued to farmers through the statutory rate in

the 1981-82 crop year – "the Crow Benefit" – should be paid in the future directly to those farmers. The grain pools, La Coalition pour la survie agro-alimentaire (consisting of, among other organizations, l'Union des producteurs agricoles and La Coopérative fédérée), and to some extent the Government of Quebec argued against this, maintaining that such a system would be perceived as a subsidization of agriculture, not of transportation. They also claimed that direct payment of the subsidy to farmers would have a deleterious effect on the Quebec livestock and meat industry. They requested that the total Benefit be paid to the railroads, which should be obliged to keep the grain freight rates correspondingly below the compensatory rate. The grain farmers wished to be protected against future increases in freight rates caused by inflation; the federal government insisted that its fiscal ability to do so was limited. Various experts disagreed on the size of the Crow Benefit and on the appropriate level of the grain transportation's contribution to the railroads' overhead costs.

In an attempt to find a reasonable middle road between such conflicting views, the Gilson Report, released in June 1982, concluded:

- The difference between the reasonable compensatory rate for transporting statutory grain, including a contribution to fixed costs, and the statutory rate (the Crow Benefit) was $644 million for the 1981-82 crop year. This figure was later revised to $659 million upon receipt of more up-to-date information.

- The contribution to constant costs should be taken as 20 per cent of volume-related variable costs.

- The federal government should commit itself by statute to the payment, on an annual basis, of an amount equal to the 1981-82 Crow Benefit. This would guarantee the farmers an amount equivalent to the present subsidy, whether or not they chose to produce statutory grain.

- The railway revenue shortfall payment should be phased in gradually. The payment should not include any contribution to constant costs in the first year, a 25 per cent contribution in the second year, and an increase of 25 per cent annually to 100 per cent in the fifth year. This would alleviate the burden on the shippers and on the federal government.

- The total railway revenue shortfall payment should be paid in the first year of the program to the railways, with an increasing proportion going to the producers in subsequent years; in the eighth year and thereafter, 81 per cent should be paid to the producers and 19 per cent to the railroads. This would gradually permit the producers to choose between rail and other transportation modes. The railroad share of the payment could be withheld if the railroads did not perform satisfactorily or provide adequate service.

- A central co-ordinating agency should be established to monitor the performance of the railroads. The first 12 per cent of constant costs should be included in the rate structure. The remaining 8 per cent, plus all line-related variable costs, should be related to railway performance. This should induce satisfactory performance and service by the railways.

- The individual producers should be allowed to elect to receive their share of the shortfall payment either as a cash payment or as a freight credit option. This recommendation would help to avoid encouragement of statutory grain production over other farm products and of rail over truck transport.

- The cost of transporting future increased volumes should be borne entirely by the producers, because they will be the main beneficiaries of such increases.

- The future cost increases of the base-year volume should be shared equally by the federal government and the producers, up to a maximum of 3 per cent for the producers during the first two years; thereafter the producers should pay the first 3 percentage points of cost increases, up to an aggregate maximum increase of 4.5 per cent for the producers. Any remaining cost increases should be borne by the federal government. This recommendation would protect producers against exorbitant future cost increases.

- Railway costs, the payment system, and the branch-line rehabilitation system should be revised every five years. Railway performance and service guarantees should be revised annually.

- The payment to farmers should be calculated and distributed by the Western Grain Stabilization Administration. The individual producer's share of the total benefit would depend on the historic yield of each quarter section, obtained from crop insurance data; on the crop rotation in the area; on the total cultivated acres; and on the increase in freight rates to the nearest shipping point.

In general, the federal government accepted the Gilson recommendations, with minor modifications. The only major modification was in the recommendation on sharing future cost increases. The federal government also proposed that during the first three years the producers pay the first 3 percentage points of inflationary costs and that thereafter they pay the first 6 percentage points.[14]

Comparing the Gilson proposals with the list of desirable features of the reform of the statutory grain

rate system we find that the proposed scheme satisfied or approximated most of them. The proposed payment scheme was complicated, but it would be difficult to devise a simpler one that would maintain neutrality between farm products and between transportation modes.

On November 14, 1983, the House of Commons passed Bill C-155 – an Act to facilitate the transportation, shipping, and handling of western grain and to amend certain Acts in consequence thereof. This Act is a major milestone in Canadian grain transportation history. It includes many of the Gilson recommendations but also differs in some respects.

Essentially, it decrees that the railroads should receive a freight rate sufficiently high to cover the variable costs, plus a specified contribution to constant costs, for the transportation of statutory grain and that this rate should be subsidized by the federal government through payment of the Crow Benefit to the railways. This change from the Gilson recommendations was the result of the renewed political pressure exerted by the wheat pools and the Quebec organizations.[15] The Act also contains a "safety-net" provision to the effect that the grain shippers' share of the freight rate should amount to no more than 4 per cent of the grain price in 1984, the limit gradually increasing to 10 per cent in 1988 and thereafter. This provision is intended to protect the farmers at a time of depressed grain prices and high interest rates. The shortfall will be made up by the federal government. In addition, Section 59 of the Act empowers the Minister of Transport to enter into an agreement with companies other than the CPR and CNR for the carriage of grain by railway. This Section permits the extension of the regulations of the Act to the provincially owned BC Rail, which transports grain from the Peace River region to Pacific ports.

The Act provides for the appointment of a Grain Transportation Agency Administrator and for an advisory Senior Grain Transportation Committee. Among other duties, the Administrator is to set performance objectives for the participants of the grain transportation system, monitor the performance of the participants, develop a notional scheme of awards and sanctions applicable to the participants for meeting, or failing to meet, the performance objectives, and report twice a year to the Minister of Transport, the Committee, and Parliament the awards and sanctions that would be applicable under the notional scheme. He is also expected to develop an actual scheme of such awards and sanctions and make recommendations to the Minister on the advisability of implementing that scheme.

The Canadian Transport Commission shall analyse, verify, and audit the investment plans and expenditures of the railways pertaining to grain transportation. It is to make an annual estimate of volume- and line-related variable costs and designate grain-dependent branch lines. Another of its tasks is to review the cost of grain transportation, including the cost of capital, the appropriateness and fairness of the grain freight rate contribution to constant costs, and the adequacy of the overall revenues of the railway system to meet its long-term needs.

The Minister of Transport shall, during the 1985-86 crop year, review the appropriateness of the apportionment of cost increases between the government and the shippers, the advisability of awards and sanctions for the grain transportation system participants, and the appropriateness of the "safety-net" provisions. The Minister was also to appoint, before April 1, 1984, a Committee to examine, and to report within one year, "all matters that, in its opinion, pertain to the method of payment in respect of grain transportation that would be the most conducive to agricultural development in Canada." That Committee, headed by Mr. Gordon Hall, has been appointed.

Although the Act goes a long way towards reforming the statutory freight rate problem, it still encourages the growing of statutory grain over other agricultural products and the use of railways over other modes of transportation, because only by shipping statutory grain by rail can the farmers continue to receive the Crow Benefit. Also the present system subsidizes the transportation of statutory grain. The price of grain on the Prairies equals the world price minus transportation costs to the market. Subsidized transportation raises the price of feed grain, as well as grain for human consumption. The present payment system results in higher feed prices for the Prairie livestock producer than would a system involving payment directly to the grain farmer. Consequently, the natural advantage of the Prairie livestock producer is artificially reduced.

For these reasons, payment of the Crow Benefit to farmers rather than to the railways would tend to increase the efficiency of Canadian agriculture. We are well aware, however, that there are arguments for making the payment to the railways instead: it is administratively simple; it may be easier to guarantee good service; it is less risky internationally, because paying the railways is less likely to be viewed as an agricultural subsidy; it avoids the danger that the tax laws may make the net payment to farmers much smaller than the gross payment; and finally, it is feared that compensatory rates will so contract the rail network as to create highway congestion.

A full examination of this highly complex issue is not possible here. Indeed, that is what the Hall Committee is charged with undertaking. Nevertheless, some principles seem worth noting, and their implications drawn out.

The form of compensation most consistent with economic efficiency would be a once-for-all lump sum. Payment could, if necessary, be arranged so as to avoid undue tax obligations. The principle determining the lump-sum payment is fairly clear: the amount should be as much as is needed to compensate for the fall in land values that could occur as a result of instituting compensatory rates. No one knows what that fall in land values would be, and indeed there is little hope of calculating it with any accuracy in advance, especially since it could take the form of a smaller increase than would otherwise have occurred.

It is clearly for the Committee, if it chose to pay the farmers, to work out what the principle of compensation for a fall in land values would imply in practice. At the moment, the process is "locked-in" to the concept of the compensation being a fixed amount, in the order of some $659 million annually. This was calculated, using various assumptions, as the amount needed to give the railways a reasonable rate of return. Exact justice is simply not possible, but the total amount of the compensation or its present value (at an appropriate discount rate, for example) may be a good approximation of what is fair. Therefore, the Committee should consider distributing compensation among farmers according to its own view of how best to judge the fall in land values as a result of the payment of compensatory rates.

A good method would be to use historical data. Using future data to determine distribution would create the risk of perpetuating distortions or making new ones, as well as being administratively difficult. With historical data, one possibility would be to determine the amount of subsidy implicitly received by each farmer over the last five years and to base the share of compensation on the share of the total subsidy received by all farmers. Thus if the total implicit subsidy of the last few years was $1 billion and one farmer had received $10,000, he or she would be entitled to 0.001 per cent of the total compensation available.

If these principles were followed, many of the objections that have been raised to paying the farmers would be overcome. For example, a lump-sum payment to the farmers should not be regarded internationally as any more of a subsidy than a payment to the railways. Basing the payment on historical data would avoid distortions that could arise if the payment were based on some criterion applicable in future years, such as land sown to grains or the market value of the grain output. And the administrative difficulties would be confined to the initial step of discovering what the lump-sum payment should be.

Under a system of compensation to farmers, the guarantee of service would be more difficult; yet it should be no more difficult than for shippers of other commodities. Equity among shippers would be preserved. Contraction of the railway network will occur only to the extent that other methods of transportation are feasible. A major shift to trucking would create congestion problems, causing the cost of shipping by road to rise and its convenience to fall. These effects would work to preserve the competitive position of the railways. We are not, therefore, convinced that the railway network would contract very much under compensatory rates.

Recognizing that the subject is very complex, we nevertheless believe that the balance of the evidence tips in favour of a serious reconsideration of the possibility of paying compensation to the farmers rather than the railways. Consequently,

30 We recommend that if the Committee to consider how the Crow Benefit is paid thinks it appropriate to re-examine the method of the Crow Benefit payment from first principles, serious consideration be given to the possibility of making the payment directly to the farmers concerned and also of making the freight rate, as prescribed by Bill C-155, payable entirely by the shippers, with due allowance for the "safety-net" provision. In the spirit of Section 59 of the 1983 Act to facilitate the transportation, shipping, and handling of western grain and to amend certain Acts in consequence thereof, the intent of which is to extend the Crow Benefit to the grain growers of the Peace River region, we urge that this recommendation apply to them as well.

Branch-Line Abandonment

Since railway transportation of statutory grain had been a money-losing activity for 25 years or more, the McPherson Committee concluded that rationalization of railway plant was imperative. Following the 1977 Report of Mr. Emmett Hall, the recommendations of the Prairie Rail Action Committee in 1978, and the Neil Report of 1979, some 3,400 kilometres of uneconomic branch lines were abandoned up to mid-1983, with an estimated 1,000 more kilometres to be abandoned in the future. The rest of the branch-line network is guaranteed to the year 2000.

In addition to the cost savings by the railways, the abandonments have other important aspects. While

some claim that abandonment condemns many small Prairie communities to extinction, the decline of the smaller Prairie business centres is due more to the ubiquity of the automobile, which makes larger communities with a more diversified choice of merchandise and services easily accessible.[16] The 1977 Hall Report pointed out that for the communities involved the employment loss created by the closing down of the grain elevators would be negligible.

Branch-line abandonment lengthens the distance between many farms and the nearest grain elevator. In the days before the automobile, grain elevators were spaced every 12 to 16 kilometres, involving a maximum farm-wagon haul of 6 to 8 kilometres. Today, delivering grain by truck to an elevator 40 kilometres away is no greater burden and permits 80-kilometre spacing of elevators. This allows the thinning-out of the branch-line network without causing undue waste of time and money to the farmer.

Branch-line abandonment increases the use of highways, as trucks drive from the farm to the next elevator. This change increases the wear and tear on the highways. Repair and maintenance of the railway roadbed is the financial responsibility of the railways; the corresponding expenses for the highways are a provincial responsibility. The magnitude of the fiscal burden shifted to the provincial governments by the branch-line abandonment is difficult to estimate. Experiments to determine the effect of trucking on the wear and tear of highways have been mostly performed in the United States, and it is questionable whether their findings would apply in Canada under the different climatic conditions. A crude estimate suggests that the present discounted cost of the further wear and tear on highways that will occur over the rest of this century as a result of accomplished and planned branch-line abandonment on the Prairies would be in the order of $90 million to $140 million of 1983 purchasing power.[17] This is a relatively modest amount when we keep in mind that the provincial road expenditures of the Prairie provinces amounted to $738 million in the fiscal year ended March 31, 1981.[18] Nevertheless, we believe that the federal government should compensate the provinces for the additional highway costs that arise from branch-line abandonments.

The Feed Freight Assistance Program

As with the Crow Rate, the Feed Freight Assistance Program has resulted in major unforeseen consequences that distort the national economy and reduce its efficiency, though to a lesser extent. This Act was introduced in 1941, after several years of excellent grain harvests, when the federal government wanted to increase meat production in eastern Canada and British Columbia as part of the war effort. A subsidy scheme was devised that equalized the price of feed grain in all Canadian regions. The plan was to end in June 1942; however, it was extended with modifications and has been in existence ever since, so that what was intended to be a short-term expedient has now been in force for over 40 years.

The scheme tends to reduce the comparative advantage of cattle and hog production on the Prairies. In 1976 the Feed Freight Assistance was reduced by $4 per short ton to British Columbia and by $6 per short ton to Ontario and western Quebec. This change wiped out almost all of the Ontario and western Quebec subsidy. The assistance to northern and eastern Quebec and to the Maritimes remained unchanged, allegedly because livestock feeders in those areas rely more heavily on outside supplies of feed grain. After representations of the B.C. government, the assistance to that province was restored to the pre-1976 level. In recent years, total shipments under the Act have amounted to about 2 million tonnes per year; the subsidy, to $15 million annually.

The original purpose of the program – to remedy a temporary, wartime problem – has become one of reducing and equalizing the price of feed grain outside the Prairies. "By distorting the locational advantages in certain lines of animal production, the subsidy has deprived the Prairies of a much needed avenue for diversification without any apparent national gain."[19] Accordingly,

31 We recommend that the Feed Freight Assistance Program be phased out over a five-year period.

"At and East" Rates

At and East rates apply to export grain and flour transported by ship from the Lakehead to Georgian Bay ports and from there by train to Montreal, Halifax, or other east coast ports. Prior to 1967 the Board of Transport Commissioners set these rates to prevent the shipments from being diverted to Buffalo, to be shipped by rail or water to New York. In 1967 the rates were frozen by federal statute at the 1960 level; the difference between the compensatory freight rate, as determined by the Canadian Transport Commission, and the actual rate frozen at the 1960 level is covered by a federal subsidy. In recent years the subsidy has been running about $35 million on shipments of around one million tonnes a year. With rates frozen and inflation continuing, the upward trend is likely to continue. Recent studies conclude that the danger of diversion to Buffalo has ceased

and "the subsidy no longer fulfils its original purpose."[20] So,

32 We recommend that within five years the "At and East" shipping rates for western grain and flour be gradually raised to the level of the compensatory rate and that the subsidy covering the difference between the two types of rates be phased out.

Railway Capacity and Its Financing

Railway freight traffic destined to the Canadian West has grown apace in the last 20 years. The tonnage transported almost doubled in the 1968-80 period. Further strong growth is expected for the 1980-92 period, with shipments of coal, potash, sulphur, and grain showing substantial increases.[21] There has been rising concern in recent years that the Canadian railway system will not have the necessary capacity to transport this volume of freight.

A realistic projection of westbound rail traffic foresees some 170 million gross ton-miles per mile for the year 1992. The most congested links of the CNR and CPR have in the past handled peak capacities totalling only 90 million gross ton-miles per mile. Thus extensive capacity expansion is imperative, and the CPR and the CNR have announced plans to make major investments in their freight-carrying capacity, subject to certain financial conditions.[22] To achieve the planned capacity expansion, the railways estimate they would have to spend $5 billion on capital expenditures in the West over the 1983-87 period. About 80 per cent of this amount would be spent on road property, and 20 per cent on equipment. The railways are planning to spend another $1.8 billion on their capital expenditure program in central and eastern Canada. The $6.8 billion expenditure is a major one. The total assets of all Canadian railways were valued at $16.6 billion in 1980. Even if we assume that this $16.6 billion is an understated figure, because it is based on valuation of the assets at the price prevailing when the capital expenditures were made – and railway investments have a long economic life – it is obvious that the planned capital expenditure program of the railways is huge.

The railways claim that the additional future freight expected would justify the capacity expansion. But in the past they argued that they could not raise the necessary funds, either internally or in the capital markets, without resolution of the Crow situation. Without that resolution, losses would have increased rapidly with the escalating inflation and the increasing volume of shipments, and they could have wiped out the profits of the railways. In this case, investors might have refused to lend to them, even if the incremental project of the western capacity expansion were profitable in itself. Elimination of the railway revenue shortfall caused by the statutory grain rate would probably be sufficient to finance the servicing of the western capacity expansion.

Manufacturing in the West and the Freight Rates

The western provinces have long desired to reduce their dependence on the production of primary products. Observing the strong fluctuations in the demand for, and the price of, these products, they wish to increase the stability of their economies by increasing diversification into manufacturing – though our analysis indicates that this popular view exaggerates western instability. Spokesmen in the West regard "value of service" pricing – with its higher freight rate on manufactured products than on raw materials and with the rate charged per ton-mile on traffic between central Canada and British Columbia being lower than on traffic with the Prairie provinces – as hindrances to the development of manufacturing on the Prairies. This view was expressed repeatedly and emphatically by the premiers of the Prairie provinces.[23] They described the existing rate-setting system, based on the National Transportation Act, as inequitable; at the same time, they emphasized that they want no special privilege or treatment.

The government of Alberta proposed a freight rate system in which rates would be based exclusively on rail car-miles, irrespective of the commodity transported. For each of the basic railway freight car types, the lowest rate would be ascertained for the shortest and for the longest shipping distance in a base year; and for the intermediate distances, the rate established would be proportional to the shipping distance. This proposed scheme was named the Equitable Pricing Policy (EPP).

Two points must be made about EPP. First, the lowest shipping rates for the shortest and longest haul are likely to cover little more than variable cost; therefore, freight rates would be considerably lower than at present, and the shortfall in railway revenues would have to be covered by a government subsidy. Second, the lowering of the freight rates would not necessarily promote manufacturing in the West. If the transportation costs of the materials and goods used as inputs and of shipments of finished products were reduced in both the East and the West by approximately the same percentage, then the competitive position of western manufacturing relative to that of the East would remain practically unchanged, and the rate change would not help western diversification into manufacturing. This assumes that freight rate reductions result in corresponding cost and price reductions in both the West and the East.

Table 10-2

Relevant Transport Charges under the Proposed Equitable Pricing Policy (EPP), Canada, 1971

SIC	Industrial category	As a proportion of value of shipments: Relevant transport charges — Actual East	Actual West	EPP East	EPP West	Reduction in transport under EPP East	Reduction in transport under EPP West	Change[1] in the West's competitive position under EPP
		(Per cent)						
	Agriculture and food							
101	Meat and poultry	2.41	3.43	1.86	2.33	0.55	1.10	0.55
102	Fish products	2.56	2.34	1.86	1.81	0.70	0.53	-0.17
103	Fruit and vegetable products	5.58	3.45	3.60	2.01	1.98	1.44	-0.54
104	Dairy products	0.28	0.29	0.21	0.18	0.07	0.11	0.04
105	Flour and breakfast cereals	4.42	5.93	2.63	3.21	1.79	2.72	0.93
106	Feed industry	7.07	7.66	3.49	3.26	3.58	4.40	0.82
107	Bakery products industry	1.83	1.08	0.98	0.55	0.85	0.53	-0.32
108	Miscellaneous food industries	1.34	3.48	0.64	2.33	0.70	1.15	0.45
109	Beverage industries	1.95	2.89	0.79	1.58	1.16	1.31	0.15
172	Leather tanneries	1.18	1.61	0.56	0.46	0.64	1.15	0.51
	Energy, chemicals and refining							
295	Smelting and refining	2.65	3.73	1.63	2.11	1.02	1.62	0.60
365	Petroleum refineries	3.75	5.28	2.69	3.79	1.06	1.49	0.43
373	Plastics and synthetic resins	7.15	5.09	3.25	1.82	3.90	3.27	-0.63
375	Paint and varnish	2.58	2.68	2.03	2.29	0.55	0.39	-0.16
376	Industrial chemicals	3.68	5.90	1.92	4.03	1.76	1.87	0.11
	Labour-oriented and footloose categories							
321	Aircraft and aircraft parts	1.24	2.65	0.62	1.13	0.62	1.52	0.90
244	Women's clothing	0.13	-	0.13	-	-	-	-
	Wood							
251	Sawmills, planing, and shingle mills	10.10	3.80	6.29	2.61	3.81	1.19	-2.62
252	Veneer and plywood mills	6.84	10.12	4.24	6.21	2.60	3.91	1.31
254	Sash, door, and other millwork	5.88	3.02	4.02	1.77	1.86	1.25	-0.61
271	Pulp and paper mills	4.17	2.94	2.08	1.40	2.09	1.54	-0.55
286	Commercial printing	1.46	1.25	0.72	0.60	0.74	0.65	-0.09

	Iron and steel							
291	Iron and steel mills	6.01	7.62	4.57	5.15	1.44	2.47	1.03
292	Steel pipe and tube mills	5.23	12.39	3.38	5.97	1.85	6.42	4.57
302	Fabricated structural metal	3.00	4.15	1.39	2.10	1.61	2.05	0.44
304	Metal stamping, pressing, and coating	3.16	7.20	1.87	3.41	1.29	3.79	2.50
308	Machine shops	2.36	2.81	1.10	1.10	1.26	1.71	0.45
309	Miscellaneous metal fabricating	2.84	5.32	1.66	2.93	1.18	2.39	1.21
311	Agricultural implements	3.75	6.45	2.19	3.52	1.56	2.93	1.37
315	Miscellaneous machinery and equipment	4.59	2.94	2.15	1.76	2.44	1.18	-1.26
324	Truck body and trailer manufacturing	8.35	11.64	4.93	6.50	3.42	5.14	1.72
	Regional market-based category							
162	Rubber products	3.03	0.89	1.77	0.42	1.26	0.47	-0.79
261	Household furniture	3.85	2.81	2.41	1.53	1.44	1.28	-0.16
264	Office furniture	4.26	5.01	2.77	2.41	1.49	2.60	1.11
328	Boat building and repair	3.47	1.47	1.99	0.71	1.48	0.76	-0.72
335	Communications equipment	2.06	4.35	0.99	2.04	1.07	2.31	1.24
336	Electrical industrial equipment	1.90	2.03	0.53	0.57	1.37	1.46	0.09
338	Electric wire and cable	1.52	3.58	0.87	1.78	0.65	1.80	1.15
354	Concrete products	12.72	6.09	8.72	3.10	4.00	2.99	-1.01
355	Glass and glass products	4.19	3.76	2.51	1.68	1.68	2.08	0.40

1 A negative sign means deterioration in the West's competitive position.

SOURCE P. S. Ross and partners, *et al., Two Proposals for Rail Freight Pricing: Assessment of Their Perspective Impact*, a report to the Federal-Provincial Committee on Western Transportation, September 30, 1974, Tables 5A to 5E.

After the Western Economic Opportunities Conference of 1973 a consortium of economic consultant firms was engaged to investigate the effect of adopting the EPP system.[24] Forty manufacturing industries judged important or promising for the West, by consent of the federal and western provincial governments, were examined in detail (Table 10-2). The relevant transport charges in 1971 were calculated for each industry in the East and the West and then recalculated with freight rates based on EPP.[25] The relevant transport charges ranged in the East from 0.13 per cent of the value of shipments (women's clothing) to 12.72 per cent (concrete products). In the West the range was from zero per cent (women's clothing) to 12.39 per cent (steel pipe and tube mills). The reduction in transport charges ranged in the East from zero (women's clothing) to 4.00 percentage points (concrete products) and in the West from zero (women's clothing) to 6.42 percentage points (steel pipe and tube mills).

If in any particular industry the reduction in charges from actual to EPP is bigger (smaller) for the West than for the East, it indicates that the West's competitive position would improve (deteriorate) with the introduction of the EPP. The introduction of EPP would strengthen the West's competitive position in 25 industries, weaken it in 14, and leave it unchanged in one. In 27 industries the value of change would be less than one percentage point of the value of shipments; in 10 industries it would be between 1 and 2 per cent; and in three industries above 2 per cent (sawmills, planing, and shingle mills, 2.62 per cent in favour of the East; steel pipe and tube mills, 4.55 per cent in favour of the West; and metal stamping, pressing, and coating, 2.50 per cent in favour of the West).

The total effect of the EPP distance-based proposal was calculated by aggregating the 40 manufacturing industries (Table 10-3). The adoption of the EPP would have reduced relevant transport costs by 40.1 per cent in the East and by 40.5 per cent in the West. Thus the advantage to the West would have been minuscule.

The cost of the scheme to the federal government would not, however, be minuscule. The estimated revenue reduction in 1971 would have been $383 million, or 0.41 per cent of GNP. The return on capital in the railway industry was already quite low, even under the actual system of rate setting, so the railway revenue shortfall would have to be covered by a subsidy. The $383 million was equivalent to 2.3 per cent of the 1971 federal government revenue. As a crude estimate, we can assume that the revenue reduction would be proportionate to the tonnage hauled (excluding statutory grain) and to the GNP deflator. For 1980 this yields a railway freight revenue reduction of $986 million, to 2.0 per cent of the federal government revenue or 0.33 per cent of GNE.[26] These results indicate that the EPP policy would involve a large subsidy but yet would not improve the competitive position of western manufacturing.

Table 10-3

Effect of the Proposed Equitable Pricing Policy (EPP) on Relevant Transport Costs in the Manufacturing Sector, Canada, 1971

	Costs		Index	
	Actual	EPP	Actual	EPP
	(Dollars per ton)		(Canada = 100)	
The East	8.80	5.27	94	95
The West	10.96	6.52	118	117
Canada	9.32	5.55	100	100

SOURCE P. S. Ross and Partners, et al., *Two Proposals for Rail Freight Pricing: Assessment of Their Perspective Impact*, a report to the Federal-Provincial Committee on Western Transportation, September 30, 1974, Table 6-C.

A distance-related, rate-setting scheme that avoids the subsidy would consist of EPP-type freight rates, scaled up so as to cover all the costs of the railways plus an "adequate" profit. But such a scheme would not improve the competitive position of western manufacturing any more than would the EPP scheme. As a "cost plus" scheme, it would destroy the incentives of the railways to increase their efficiency. Also a "modified EPP scheme" would not lead to a socially optimal allocation of resources.[27]

One could, of course, always design schemes where specific western manufacturing industries could be helped by tinkering with specific railway freight rates. Such types of policy would, however, be inferior to a direct subsidy should Parliament regard subsidization justified and desirable. Also, such specific tinkering would be in direct contradiction to the statement of the Prairie premiers that the West is not "requesting special privilege" and "does not expect special treatment." Therefore,

33 We recommend that the present latitude in setting freight rates, as prescribed in the National Transport Act, be retained. If diversification or stimulation of western manufacturing is regarded as in the national interest, it should not be achieved by tinkering with transportation freight rates.

Nationalization of the Roadbed

Many of the seeming anomalies in railroad freight-rate setting, the consequent complaints, and often acrimonious arguments are caused by disagreements over the share of fixed costs that should be borne by specified individual shipments. There is general agreement that the rate for each shipment – except, perhaps, for statutory grain – should cover its variable cost. One approach to the solution of the freight rate problem would be to nationalize the railway roadbeds, with appropriate compensation, to cover upkeep, repairs, and future expansion from general government revenues, then to lease back the roadbeds to the railroad companies, perhaps at a nominal fee. We consider three aspects of such a proposal: the costs, the benefits, and the administrative implications.

One study estimated that the annual roadbed costs amounted to $821 million in 1972.[28] We can obtain a rough estimate for 1980 by adjusting for inflation and assuming no increase in roadbed expansion between 1972 and 1980. This yields $1,760.8 million for 1980, or 2.6 per cent of the total federal government expenditure for that year – a very large amount.

The results of the study investigating the Equitable Pricing Policy indicate that the adoption of a freight-rate system based on variable costs would have a negligible effect on the competitive position of western manufacturing, relative to that of the East, and would not aid in the economic diversification of the western provinces. The same conclusion is applicable to the policy of nationalizing the roadbeds.

Nationalization of the roadbeds would cause very severe problems for the efficient management and administration of the Canadian railroad system. There are very few cases in which the fixed investment of a railway is owned by the state and the operation of the railway is managed by a private or Crown corporation along business principles, thus separating the responsibility for the roadbed from all other responsibilities of railroading. The organization responsible for the amount and location of new roadbed construction would have to make its decisions without an intimate knowledge of current railway operations. The operating companies would blame their financial losses and shortcomings in service on the organization responsible for the roadbed.

In most industries, investment in construction substitutes for other inputs. As well, the profit motive induces management to achieve the optimal combination of inputs in order to minimize the cost of the desired output. This holds true for the railroad industry. The separation of responsibilty for the roadbed from all the other tasks of managing the railway is almost certain to reduce the efficiency of the railways. Accordingly,

34 We recommend that the roadbed of the railways not be nationalized.

The Canada West Foundation recommended the establishment of a Crown corporation that would own the infrastructure of the two major rail companies lying west of Thunder Bay. Such an arrangement would cost about half as much as nationalizing the total roadbed but would have all the disadvantages, with the additional complication that the railways would retain the responsibility for the other half of the roadbed in the East. Also, a policy under which the costs of the western roadbed were financed by federal taxes while those of the East were underwritten by freight rates could not be regarded as equitable and evenhanded.

Freight Rates and the Cost of Living

Ever since the settlement of the Prairie provinces, westerners have complained that the railways have used their monopolistic position to keep freight rates high on manufactured goods destined for the West and thereby depressed the standard of living on the Prairies. The question is whether this claim is valid.

The population of the Prairie provinces is smaller, and its density lower, than that of the central provinces. Manufacturing plays a bigger role in the economic life of the central provinces, and, on average, their manufacturing establishments are bigger; moreover, the huge producing and consuming market of the eastern United States is close by. We would, therefore expect more competition in the sale of manufactured goods in the central provinces than in the Prairie provinces and more market power among big central manufacturers than among the relatively smaller Prairie ones. Also, as we have seen in the earlier part of this chapter, the railways enjoy a somewhat stronger monopolistic position in the Prairie provinces than in central Canada.

Under such circumstances, Prairie manufacturers shipping to the central provinces would have to contend with strong competition from central manufacturers and from imports. Shipments to the central provinces require relatively low freight rates in order to remain competitive. In the Prairie provinces competition from local manufacturers is relatively weak, so railway freight rates are high. Table 10-4 shows that the freight revenue per ton-mile on manufactures is indeed considerably lower when shipped from the Prairies to the central provinces than in the opposite direction. The freight revenue on manufactures from the central provinces to the Prairies was 4.89 cents per ton-mile in 1980 but 2.35

Table 10-4

Freight Revenue Received from Shipments of Manufactures and Miscellaneous Goods, Within and Between Selected Areas, Canada, 1980

From/To	Central Canada	Prairie provinces
	(Cents per ton-mile)	
Central Canada	4.41	4.89
Prairie provinces	2.35	4.57

SOURCE Canadian Transport Commission, *Commodity Flow Analysis 1978-80: Canadian Carload All-Rail Traffic*, Reference Paper No. 1.6 (Ottawa: CTC, 1982), Table 64.

cents in the opposite direction. The revenue on manufactures was 4.41 cents per ton-mile within the central provinces and 4.57 cents within the Prairies. The difference is small and suggests that highway transportation acts as a strong restraining force on freight rates in both areas.

The data indicate that the railways have indeed behaved as discriminating monopolists. This does not prove, however, that they have excessively exploited their monopolistic position, given that they have to earn total costs plus a reasonable profit. In 1980, for example, the return on assets in the railway industry was 6.4 per cent – modest compared with that in most other industries (Table 10-5).

Two points must be raised about these data. The rate of return in the railway industry is depressed by the loss incurred in transporting grain. Perhaps the return on other freight, particularly on manufactured goods shipped to the Prairie provinces, is excessive after all? In adjusting the railroad rate of return in 1980 for the loss incurred in statutory grain transport, as calculated in the Gilson Report, we find that the rate of return was 10.7 per cent – slightly, but not substantially, higher than the "all industries" average.

This is not the end of the story. Inflation has an effect on the real return on assets by influencing the amount of depreciation, inventory valuation, and debt. Time and resource constraints prevented us from investigating these factors in detail, but a recent calculation shows that the net book value of railroad capital stock (including land) was $6,057 million in 1979, while the replacement value was $8,795 million – 45 per cent higher.[29] It is reasonable to assume that the adjustment for depreciation would be lower in most other industries because the economic life of railroad investment is relatively long.

Table 10-5

Return on Assets in Selected Industries, Selected Years, Canada, 1969-80

	1969	1971	1975	1976	1977	1978	1979	1980
				(Per cent)				
Agriculture, forestry, and fishing	5.4	4.4	5.9	7.3	7.7	9.8	10.4	11.0
Mining	7.0	5.2	7.6	8.3	8.5	8.4	11.8	11.3
Manufacturing	6.5	6.0	7.6	7.4	6.9	8.1	9.4	9.3
Transportation equipment	7.5	7.4	7.2	8.5	7.6	6.6	7.0	4.1
Storage	4.4	6.9	8.2	8.1	9.4	8.6	8.7	12.9
Communications	5.8	6.2	7.5	7.0	7.1	7.2	7.8	7.6
Public utilities	6.2	4.7	6.4	7.0	8.2	8.6	9.0	8.9
Construction	4.8	5.0	7.0	6.8	6.0	6.1	7.0	7.5
Wholesale trade	5.7	5.9	6.6	6.7	5.9	6.7	7.8	7.9
Transportation	4.1	4.3	4.9	5.2	5.4	6.3	7.0	7.3
Air	3.6	4.6	4.6	5.1	6.8	7.1	6.8	7.2
Water	3.8	3.7	4.4	2.4	0.5	3.9	5.5	6.7
Rail	2.6	2.6	2.9	3.9	4.2	4.8	6.3	6.4
Truck	7.7	7.6	6.2	6.9	7.8	8.3	9.2	9.3
Bus	9.0	4.3	6.1	4.2	3.7	5.9	5.3	11.3
Taxicab	6.5	5.1	6.6	6.4	9.8	7.4	8.4	11.3
Pipeline	7.1	7.8	9.0	9.3	9.3	9.0	8.4	7.7
Other	6.3	3.5	5.7	6.1	5.5	6.4	6.7	6.5
All industries	6.1	5.8	7.4	7.5	7.4	8.2	9.5	9.5

SOURCE Transport Canada, "Canadian Freight Transportation System Performance and Issues," Discussion Paper, August 1981 and Canadian Imperial Bank of Commerce, *Capital at Work: Selected Corporate Ratios*.

Our conclusion is that although freight rates are indeed higher to and within the Prairie provinces than to and within the central provinces, this is a consequence of geographical and demographic circumstances rather than the excessive abuse of the monopolistic power of the railways. As an alternative to the current practice of rate setting, the Canadian Transport Commission could prescribe rates by fiat and subsidize western transportation. But this would reduce the efficiency of the Canadian railroads, and it is the West that has the biggest stake in an efficient transportation system. A partial remedy lies in encouraging, but not subsidizing, competition from trucking and perhaps air transport. Future growth of the population on the Prairies will also help to mitigate the disadvantages arising from a relatively small and sparse population.

Productivity Growth of the Canadian Railroad Industry

Our review of the problems of, and complaints about, the railroad system in the West may convey the faulty impression that the Canadian railways are inefficient and do not serve the nation and its economy well. Nothing could be further from the truth. The long-term productivity increase in the Canadian railroad industry has been about 3 per cent annually, almost twice the productivity growth rate of the U.S. railroad industry.[30] Also, the productivity of the Canadian railroads grew about 40 per cent faster than that of the Canadian economy as a whole, and their 3 per cent productivity growth is higher than in 30 of 31 Canadian industries calculated in a recent study.[31]

Road Transportation

Road transportation plays a very significant role in the Canadian economy. More tonnage is transported by truck than by railroad, though railroads haul, on average, heavier shipments over longer distances than trucks do. Also the private automobile and the bus have outcompeted the railroad as a means of personal transportation over short and medium distances, as has the airplane over long distances. While the role of road transportation is somewhat different from that of the railroads, it is now no less important. This is as true in western Canada as in the East.

This being so, we note that there have been relatively few complaints about road transportation in western Canada. When trying to understand this phenomenon, we must keep in mind that trucking has enjoyed several psychological advantages. The railroad was in a monopoly position until the 1920s, and the truck brought a much desired and welcome alternative mode of transportation to the Prairies. With highways being financed by the provinces, trucking firms did not have such high fixed costs as the railroads and could avoid the thorny problem of the unequal allocation of fixed costs to individual shipments. In addition, for-hire trucking is an industry in which firms have to contend not only with competing firms, but also with the possibility that producers may prefer, if rates are too high, to buy their own trucks and deliver their own output. As a result, for highly manufactured products – goods with a relatively high value per ton – trucks, and to a lesser extent airplanes, have "creamed off" most of the high-valued freight. Road construction and the regulation of highway transportation are, in practice, a provincial responsibility, in contrast with railway transportation, which is under federal control, and this helps to eliminate regional discontent. Last, but not least, there are no statutory freight rates on road transport, no substantial losses imposed by law on the transportation of certain specified products, and consequently no deterioration in equipment and service. Trucking regulations in Saskatchewan and Manitoba cause some losses and inefficiencies,[32] but these pale by comparison with those of the railways, which have been brought about by the Crow Rate.

Whether road transportation in Canada and in the Canadian West is as efficient as it could be is an open question. Ideally, truck user fees should cover their share of the cost of road construction, or at least of upkeep. Knowledge about the effect of truck transport on road wear is imperfect and is based on U.S. research, which may not apply under Canadian weather conditions. Also, the coordination of provincial regulations of truck transport is desirable if we want highway transportation to provide as much competition to railways as is economically desirable. Recalling an earlier document by the Economic Council,[33]

35 We reiterate our recommendation in *Reforming Regulation* that all regulatory restrictions on the operating freedom of existing for-hire motor carriers be removed, that the process of applying for trucking licences be simplified, that price regulation be abolished, and that the permission for own-account trucking be expanded to cover the transportation of the goods of corporate affiliates, in addition to those of the parent corporation.

Water Transportation

In eastern Canada, water transportation plays an important role in internal, as well as export, trade using the Great Lakes and St. Lawrence River systems. Western Canada lacks internal waterways, and there international trade dominates water transport. The ports of British Columbia handled some 57

million tonnes in 1980, about 90 per cent of which were loadings and 10 per cent unloadings. The great majority, about 70 per cent, of loadings consisted of bulk cargo: coal, grain, sulphur, potash, and forest products. The port facilities of Vancouver and Prince Rupert are being expanded satisfactorily, and no serious bottleneck problems are expected, except perhaps in grain handling, where major government-negotiated export contracts can impose sudden and unpredictable strains on the system. The substantial investment in grain handling facilities at Prince Rupert, partly financed by the government of Alberta, should help to provide a much-needed alternative port. Unit trains and highly mechanized bulk-loading equipment have contributed to the remarkable increase in the productivity of the Canadian railroad system. Two-thirds of the statutory grain production moves east towards Thunder Bay; and the St. Lawrence Seaway and its weakest link, the Welland Canal's Lock 7, is likely to be able to handle future traffic without bottlenecks until the turn of the century. For the expansion of the Seaway, however, construction lead time will be long (10 years or more); therefore, careful monitoring and forecasting of the traffic growth is important.

Canada's export trade consists largely of bulk goods and has traditionally been shipped in foreign-flag vessels. On the whole, these have provided reliable and inexpensive service, which is important in the highly competitive markets of basic commodities. High transportation costs would reduce the competitive advantage held by Canadian producers of such goods. The vital importance of B.C. ports to Canada's trade with the Pacific Rim requires that continuing attention be paid to adequate port facilities, infrastructure, and operating conditions.

Some controversy has arisen over the "destuffing clause," which requires that containers destined for multiple consignees within 80 kilometres of Vancouver be unloaded at the dock. It is claimed that this clause directs part of Vancouver's container traffic to Seattle. It does not follow automatically, however, that the abolition of the destuffing clause would necessarily direct Canada-destined containers that are currently being shipped to Seattle to the port of Vancouver. The U.S. market is much bigger than the Canadian one. Many ships carry containers destined partly for the United States and partly for Canada. Unless a ship carries a large number of containers destined for Canada, it is more economical to offload these containers in Seattle and ship them overland to Canada than to make a separate call at the port of Vancouver.[34] Certain specialty grains, however, are exported to the Pacific Rim in containers, and the bypassing of Vancouver by container ships, because of the destuffing clause, would inhibit Canadian containerized exports.

It is desirable for Canada's foreign trade that highly competitive conditions persist in ocean shipping. Recently concern has arisen that competition in this field will diminish in the future.[35] In 1974 the United Nations Conference on Trade and Development (UNCTAD) adopted the Code of Conduct for Liner Conferences. Liners are cargo ships running on fixed time schedules and itineraries. Conferences are associations of shipping lines that ply a particular trade route and agree on rates and services. Article 2 of the UNCTAD Code apportions the carriage of liner (i.e., nonbulk) cargo in the following manner: 40 per cent of the volume generated by the mutual trade of the two trading nations should be reserved for the national shipping lines of each of the two countries; the remaining 20 per cent, for third-country lines.

The Code was ratified in October 1983, with the European Economic Community (EEC) accepting it, subject to the "Brussels Package." According to the Brussels Package, the trade between developed countries (EEC and non-EEC OECD countries prepared to join on the basis of reciprocity) would be treated as a bloc and would not be subject to the strict nationality requirements of the UNCTAD code. In the trade between developed and undeveloped countries, the Package provides that the Code should apply, but the distribution of the share to be carried by developed-country lines will be governed by commercial criteria.

Since the adoption of the UNCTAD Code, non-Conference lines have grown substantially and exert a downward pressure on freight rates. Nevertheless, cargo reservation in conformity with the UNCTAD Code reduces competition, and the possibility of its extension to bulk cargo is a cause for concern. The same applies to the increasing role played by the state-owned COMECON fleets. These are vehicles for cargo preference practices exercised by the communist countries and are viewed as a serious threat to the economic health of EEC commercial liners. We believe that future developments threatening competition in ocean shipping should be carefully monitored and that the Canadian government should make every effort to preserve cheap transportation for our overseas trade.

Air Transportation

Air transportation is predominantly passenger transportation; indeed, for long distances it has become the predominant form of passenger transport. Still some 12 to 15 per cent of Canadian airline revenue comes from air freight. Whenever speed is essential because the product is perishable or

urgently needed, or where the freight is of small bulk and high value, air transport is the preferred mode. Also, locations like the far North are not accessible by any other means of transport.

The volume of air cargo grew rapidly between 1950 and the time of the OPEC price increase in 1973, and the share of all Canadian freight revenues about quadrupled. As air transportation uses more fuel per ton-mile than other modes, its growth has slowed down substantially since 1973. Fuel costs were about 10 per cent of operating costs in the early 1970s and are now 30 per cent. Should the price of petroleum continue to increase faster than that of other goods, as most experts predict, the cost of air transportation will continue to be a moderating force.

Another reason why the expansion of air traffic, particularly to smaller communities, will be restrained is the cost of airports. Only the largest airports raise enough revenue to cover expenses. It takes traffic of over 4 million passengers arriving or departing per year to break even on airport operations and only Toronto (with 13.4 million in 1981), Vancouver (with 6.8 million), Montreal-Dorval (with 6.3 million), and Calgary (with 4.3 million) reach this level.[36] All other airports operate at a deficit. Expansion into remote areas is expensive and not self-financing. Building or expanding airports in such a case are, from the national point of view, essentially speculative investments. This does not mean that such construction is never justified as a public service; rather, decision-making in this field must proceed circumspectly and with caution.

Pipelines

Pipelines account for a quarter of all ton-miles transported in Canada. They are a very specialized mode of transportation, essentially restricted to oil and gas. Their future is dependent upon the quantity and location of future hydrocarbon energy discoveries. The technology of pipelines for the transportation of coal in slurry form is not well developed as yet. Also, the cost of transporting coal by slurry pipelines must compete with one of the most efficient and mechanized transportation systems: the unit coal train.

Conclusion

Traditionally great importance has been attached to the role of transportation in economic development. Our discussion in this chapter indicates that western transportation problems need not act as a restraining force on the economic growth of the western provinces. Transportation costs amount to a relatively small percentage of the selling price of manufactured products. The competition between railroads and trucking is fierce and tends to keep freight rates low. In addition, market competition is an effective restraint on freight rates for bulk commodities.

Extensive research has been done on the effect of setting freight rates on the basis of distance alone. When the rate changes for both inputs and outputs are taken into account, the results indicate that such a regime would not help the West's efforts to increase and diversify its manufacturing industry – the competitive position of western versus central manufacturing as a whole would remain practically unchanged. Freight rates for manufactured goods going from the central provinces to the Prairies are higher than for those going in the opposite direction. This tends to raise the cost of living on the Prairies but also aids western manufacturing concerns.

There are strong indications that the National Transportation Act, with its confident reliance on competitive forces, has acted as a stimulant to railway productivity growth. And, with the revision of the freight rate for statutory grain, the main obstacle to the expansion of western railroad capacity has been removed. Except for long-distance shipment of bulk commodities, where the railroads have a natural advantage, truck transportation plays as important a role in the West as in the rest of Canada. The expansion of port facilities provides an adequate outlet for the maritime transport of our foreign trade.

Canada's transportation system is efficient and serves the interests of the country and of the West well. There are, however, certain features, rooted in institutional causes, that are harmful now and will become more so in the future. Prompt action with regard to our recommendations would go a long way towards solving many of the current problems.

11 The Service Industries and Economic Growth

The largest and fastest-growing sector of the national and provincial economies is the service sector. As such, it is a major vehicle of economic growth, for reasons that are neither illogical nor unnatural. Services contribute a substantial part of all growth in living standards and create the great majority of new jobs. The corollary is that if policy makers in the western provinces wish to stimulate growth in jobs or living standards, or both, they must pay attention to the service sector.

The service sector encompasses a vast variety of activities, some of which have been the "high flyers" in their contribution to employment growth. Comparing the experiences of the western provinces with national and international performance shows that changes over the last couple of decades have worked in similar directions. The result is that, today, services employ by far the vast majority of people regionally, nationally, and internationally, and are expected to continue to do so.

Services also contribute to economy-wide productivity growth and hence to living standard growth, both directly through increased efficiency in the service sector and indirectly through the links between the services and other industries. All of these factors point to a new role for public policy.

The Place of Services in the Economy

There are some dissimilarities in the economic structure of the West and the rest of Canada. But there are also many important similarities.

The dissimilarities stem from the relative size of the resource and manufacturing sectors, although together these goods-producing sectors represent about the same proportion of employment and of output in the West as in the rest of Canada. In the West, employment in the natural resource industries as a proportion of total employment is larger than it is in Ontario and Quebec; in Saskatchewan it is very much larger. Manufacturing employment, by contrast, represents a very much larger proportion of total employment in Ontario and Quebec than it does in the West.

The similarities between the West and the rest of Canada derive from the relative size of the service sector. In both regions, employment in the service sector amounted to roughly two-thirds of total employment in 1981. The service sector is also the most rapidly growing sector, provincially and nationally. Thus in this very significant aspect the economic structure in the West is really no different from that in the rest of Canada, which may come as a surprise to some.

This large sector is composed of the 129 service industries listed in the current Standard Industrial Classification Manual (1971); they are divided into 21 major groups, which form 5 industry divisions:

Community, business, and personal services:

- Education and related services
- Health and welfare services
- Religious organizations
- Amusement and recreation services
- Services to business management
- Personal services
- Accommodation and food services
- Miscellaneous services

Public administration and defence:

- Federal administration
- Provincial administration
- Local administration
- Other government services

Trade:

- Wholesale trade
- Retail trade

Finance, insurance, and real estate:

- Finance industries
- Insurance carriers
- Insurance agencies and real estate

Transportation, communication, and other utilities:

- Transportation
- Storage
- Communication
- Electric power, gas, and water utilities

The sector obviously encompasses a wide array of industries and activities. Although it includes activities

Table 11-1

Distribution of Employment, by Industry and by Province, Canada, 1961 and 1981

	Agriculture	Forestry	Fishing, hunting, and trapping	Mines, quarries, and oil wells	Manufacturing	Construction	Transportation, communication, and other utilities	Trade	Finance, insurance, and real estate	Community, business, and personal services	Public administration and defence	All industries[1]
						(Per cent)						
1961												
Newfoundland	1.5	6.3	7.7	3.9	11.2	8.8	14.0	17.4	1.3	16.3	11.6	100.0
Prince Edward Island	27.5	0.4	6.2	—	9.0	6.6	8.3	14.3	1.7	17.0	8.9	100.0
Nova Scotia	5.2	1.8	3.2	4.3	14.6	6.7	10.7	15.8	2.4	19.3	15.8	100.0
New Brunswick	7.2	6.0	2.1	0.9	16.3	6.3	12.4	16.7	2.2	19.8	10.0	100.0
Quebec	7.6	2.5	0.2	1.5	27.2	7.4	9.4	14.4	3.6	20.4	5.8	100.0
Ontario	7.2	0.8	0.1	1.8	27.5	6.6	8.3	15.8	4.2	20.0	7.7	100.0
Manitoba	17.7	0.4	0.4	1.7	13.9	6.2	11.9	17.1	3.6	19.1	7.9	100.0
Saskatchewan	37.5	0.4	0.4	1.3	4.8	5.4	9.5	14.3	2.2	18.5	5.7	100.0
Alberta	21.6	0.6	0.2	3.6	8.8	7.8	9.9	16.7	3.1	19.5	8.1	100.0
British Columbia	4.2	3.8	0.8	1.5	20.2	6.5	11.2	17.7	4.0	22.1	8.2	100.0
Canada[2]	10.2	1.7	0.6	1.9	22.3	6.8	9.6	15.7	3.6	20.0	7.6	100.0
1981												
Newfoundland	0.6	1.8	4.6	3.1	17.0	7.6	8.8	16.8	3.0	27.6	9.1	100.0
Prince Esward Island	10.6	0.5	5.1	0.2	10.6	8.1	7.3	14.9	2.9	28.6	11.1	100.0
Nova Scotia	2.3	1.3	2.0	1.8	14.9	6.6	8.0	17.4	4.4	29.2	12.2	100.0
New Brunswick	2.5	3.2	1.2	1.4	16.7	7.4	9.2	17.1	3.6	27.8	9.8	100.0
Quebec	2.7	0.8	0.1	1.1	22.4	5.2	8.2	16.4	5.1	30.5	7.6	100.0
Ontario	3.3	0.3	0.1	1.0	23.8	5.7	7.2	16.8	5.9	29.0	7.0	100.0
Manitoba	8.5	0.3	0.3	1.4	14.1	5.3	10.3	17.4	5.1	28.6	8.7	100.0
Saskatchewan	19.4	0.3	0.1	2.9	6.2	7.0	8.1	16.9	4.3	26.8	7.9	100.0
Alberta	6.9	0.3	—	6.4	9.0	10.8	8.4	17.0	5.5	28.2	7.4	100.0
British Columbia	2.4	2.8	0.5	1.7	14.8	7.8	9.2	17.6	5.6	30.5	7.2	100.0
Canada[2]	4.2	0.9	0.3	1.8	19.2	6.5	8.0	16.9	5.4	29.3	7.6	100.0

1 Excludes industries unspecified or undefined.
2 Excludes Yukon and Northwest Territories.
SOURCE Based on census data from Statistics Canada.

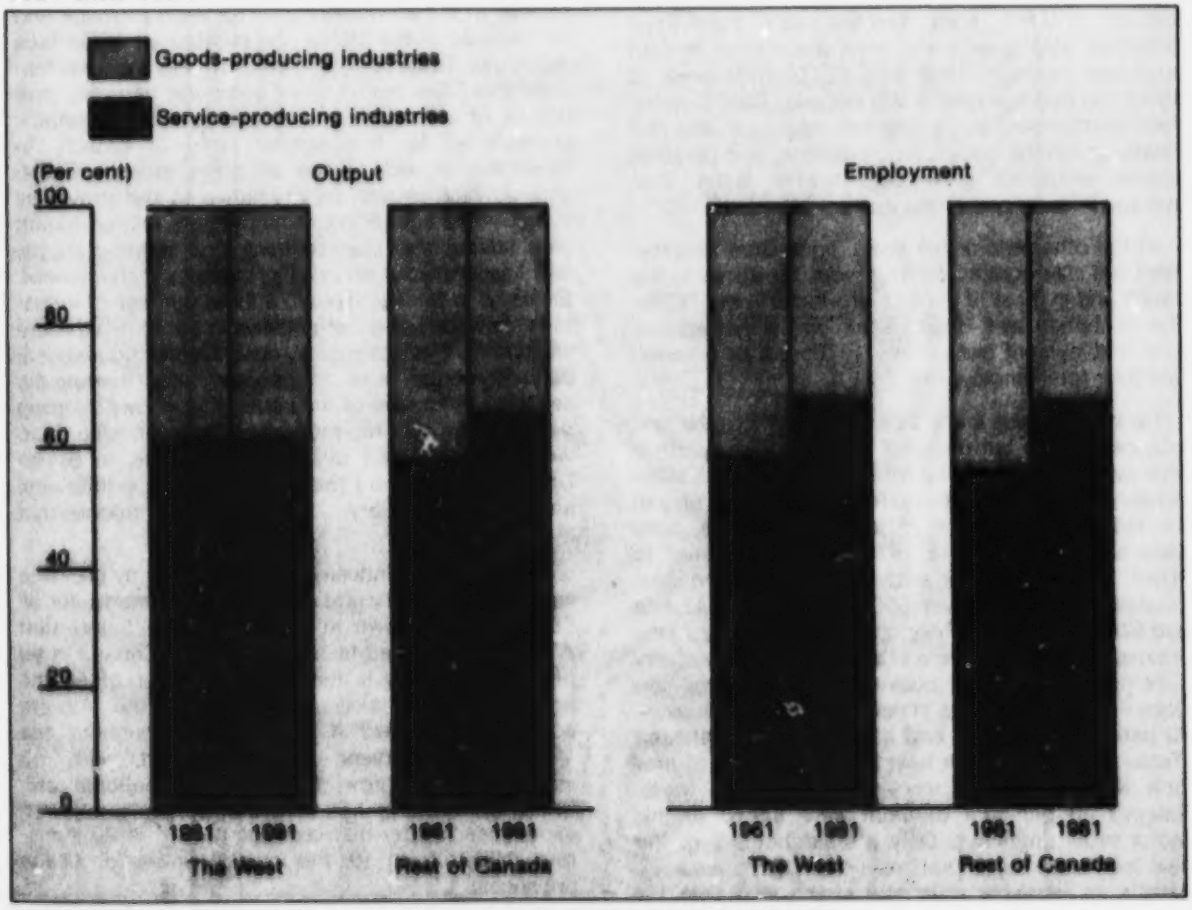
dedicated exclusively to use by business or exclusively by households, the greater part of the service sector is oriented towards filling the needs of both.

Table 11-1 shows how employment is distributed across all industry divisions. In 1981 in Manitoba, Saskatchewan, Alberta, and British Columbia, the largest industry division, based on relative employment size, was community, business, and personal services. In all provinces except Saskatchewan, trade ranked second. In Saskatchewan, it ranked third, behind agriculture. In British Columbia and Manitoba, the industry that ranked third was manufacturing; in Alberta, it was construction. Employment in two service industries alone – namely trade, and community, business, and personal services – far exceeded that in natural resources. In all provinces except Saskatchewan and, to some extent, Alberta, manufacturing ranked relatively high compared with most other industries. In these respects, the employment structure of the western provinces parallels that of the rest of Canada.

The pattern of gross output in the West is also very similar to that in the rest of Canada (Chart 11-1). In 1961 the services share of output was slightly larger in the West than in the rest of Canada; in 1981 it was slightly smaller. In both years, the services share of output exceeded 60 per cent of the total; the remainder was in the goods-producing industries.

Chart 11-1

Distribution of Output and Employment in the West and the Rest of Canada, 1961 and 1981



SOURCE Based on data from Statistics Canada and from the Conference Board of Canada.

In both the West and the rest of Canada, the distribution of gross output and employment is remarkably similar. In 1961 the services share of output was only slightly higher than that of employment in each case; in 1981 the situation was the reverse.

Employment in total grew rapidly between 1961 and 1981 (Table 11-2). In the 1971-81 period, employment grew fastest in Alberta, followed closely by British Columbia; that in Saskatchewan and Manitoba was well behind.

Employment in three industries grew faster than average in all four provinces from 1971 to 1981. All were in the service sector. Finance, insurance, and real estate topped employment growth, increasing at more than twice the average rate in Manitoba and Saskatchewan, at just under twice the average in Alberta, and one-third faster than average in British Columbia. The community, business and personal services industry was next fastest in this group, followed closely by trade. The first two of these three industries also grew faster than average in all four provinces between 1961 and 1971; trade grew at about the average rate in this decade. For 20 years, then, employment in the finance, insurance, and real estate and in the community, business, and personal service industries grew considerably faster than average in every one of the western provinces.

At the other end of the scale, agricultural employment actually contracted in all four provinces in the 1960s and in three of the four provinces in the 1970s. The exception was British Columbia, where agricultural employment grew in the 1970s but at a slower rate than total employment.

Table 11-2 gives some indication of where the new jobs came from but does not tell the full story, since high rates of growth may reflect, in part, small initial industry size. It is necessary, therefore, to look also at the industry distribution of job gains. These gains were substantial. In the 1970s, they amounted to about 100,000 jobs for each of Manitoba and Saskatchewan and just over 500,000 each for Alberta and British Columbia. Fully one-third of the new jobs created in the 1970s were in a single service industry – namely, community, business, and personal services – with the increase in new jobs ranging between 30 per cent in Alberta and 41 per cent in Manitoba (Table 11-3). Easily the next highest number of new jobs was created in wholesale and retail trade. Roughly 20 per cent of them were added to this sector in all provinces. Only a small number of the new jobs were in natural resources. Manufacturing, despite its relatively small size in the West, yielded just over 10 per cent of the new jobs in Manitoba and British Columbia in the 1970s and a respectable 7 per cent and 8 per cent in Saskatchewan and Alberta, respectively.

The story of job increases in the 1960s was very similar to that in the 1970s. Community, business, and personal services accounted for somewhat more than one-third of the extra jobs during this period; trade, a little less than one-fifth. Together, the two had over half the job growth, just as in the 1970s. Manufacturing did even better in the 1960s than in the 1970s, accounting for over 10 per cent of the new jobs in all provinces except Saskatchewan, and for nearly 10 per cent even there.

Since the bulk of new jobs in the economies of the western provinces appeared in the community, business, and personal services industry in the 1960s and the 1970s, it is worthy of deeper examination. Altogether, the community, business, and personal services industry comprises 52 uniquely identified "industries" or types of activity. To show the employment growth performance of each service industry relative to the all-industry total for each province and for Canada in the 1970s, we created an index (see Appendix Table C-1). In each of the four western provinces, two industries – computer services, and offices of management and business consultants – showed by far the highest rates of growth. In Manitoba, a wide range of other industries also showed high growth rates relative to the provincial industry average. Some examples are related health care institutions; blacksmithing and welding shops; and miscellaneous services to business management. Similarly, in Saskatchewan, a large number of industries showed high growth indexes: related health-care institutions; postsecondary, nonuniversity educational establishments; and diagnostic and therapeutic services. Examples of industries that showed strong performance in Alberta were blacksmithing and welding shops; and offices of architects. In British Columbia, they were related health-care institutions; and postsecondary, nonuniversity educational establishments.

Comparing the industry rates of growth by province with the all-industry rate of growth for Canada, for all 65 industries shown in Table C-1, we found that Alberta experienced faster growth than Canada in 50 of these – which is the largest number of all the provinces. It certainly indicates that the Alberta economy diversified a great deal throughout the 1970s. Newfoundland ranked second, with 43 industries having grown faster than the national rate; British Columbia ranked third with 37. Saskatchewan experienced faster-than-average growth in 20 industries, Manitoba in 10, the lowest number of all the provinces.

High rates of growth appear for some industries partly because employment grew rapidly throughout

Table 11-2

Change in Employment in Each Decade, by Industry and by Province, Canada, 1961-81

	Agriculture	Forestry	Fishing, hunting, and trapping	Mines, quarries, and oil wells	Manufacturing	Construction	Transportation, communication, and other utilities	Trade	Finance, insurance, and real estate	Community, business, and personal services	Public administration and defence	All industries[1]
						(Per cent)						
1961-71												
Newfoundland	-28.4	-63.6	-18.8	15.1	44.7	63.1	7.8	22.3	83.0	45.1	-6.2	24.0
Prince Edward Island	-36.3	-22.5	1.8	1,150.0	39.5	27.1	11.9	23.3	52.9	39.7	58.7	17.2
Nova Scotia	-40.9	-27.4	-25.4	-39.0	21.1	38.7	-4.1	18.3	56.4	32.2	4.7	14.3
New Brunswick	-46.6	-36.0	-30.6	95.3	27.8	40.5	4.2	17.9	54.2	31.1	25.3	18.0
Quebec	-44.4	-48.4	-37.9	-2.0	7.6	-5.3	6.5	18.8	45.7	32.7	41.1	14.3
Ontario	-23.0	-52.8	-34.8	-4.9	27.4	33.7	13.7	34.3	57.9	40.7	36.5	33.1
Manitoba	-20.6	-46.9	-73.1	38.9	21.9	6.8	0.7	13.7	29.4	32.2	28.2	14.8
Saskatchewan	-15.6	-19.2	-75.4	83.9	31.1	3.4	-8.5	13.4	48.9	28.1	44.8	8.5
Alberta	-16.3	-25.8	-75.0	53.3	47.9	40.3	15.0	30.1	71.9	44.6	40.1	33.2
British Columbia	-1.0	31.4	-14.2	79.9	30.0	75.9	38.0	48.3	84.3	45.1	24.1	49.5
Canada[2]	-24.9	-31.6	-27.6	14.2	21.5	24.8	11.2	28.0	56.4	38.1	32.6	25.9
1971-81												
Newfoundland	15.7	56.2	45.3	33.8	106.0	4.2	14.4	55.0	145.2	82.3	63.7	58.4
Prince Edward Island	-0.3	168.2	31.3	140.0	38.5	57.0	28.0	38.3	88.8	66.3	28.4	39.9
Nova Scotia	19.7	51.9	33.2	5.8	32.7	12.3	22.6	46.3	81.0	61.1	15.6	37.9
New Brunswick	8.8	37.6	31.6	22.3	32.2	38.7	17.6	42.7	76.0	59.8	28.5	39.7
Quebec	5.3	10.1	32.2	19.5	27.9	25.3	36.5	60.3	61.6	68.0	55.2	46.4
Ontario	9.0	69.8	70.2	3.3	25.9	19.6	40.3	46.8	63.9	59.6	23.0	39.2
Manitoba	-12.0	122.7	268.1	-13.5	20.9	16.6	26.4	30.7	56.9	48.3	25.2	27.1
Saskatchewan	-14.8	62.3	-23.2	72.7	37.7	72.0	28.9	44.5	80.3	45.0	31.8	27.8
Alberta	-6.5	85.7	33.3	182.6	68.9	141.0	80.1	90.1	155.6	95.9	58.9	83.5
British Columbia	37.0	33.7	68.2	53.6	34.8	64.7	41.6	60.6	81.3	81.0	68.2	59.9
Canada[2]	--	35.6	46.2	51.1	30.0	39.7	39.3	54.1	73.3	66.5	38.2	45.9

1 Excludes industries unspecified or undefined.
2 Excludes Yukon and Northwest Territories.
SOURCE Based on data from Statistics Canada.

Table 11-3

Distribution of Increase in Employment in Each Decade, by Industry and by Province, Canada, 1961-81

	Agriculture	Forestry	Fishing, hunting, and trapping	Mines, quarries, and oil wells	Manufacturing	Construction	Transportation, communication, and other utilities	Trade	Finance, insurance, and real estate	Community, business, and personal services	Public administration and defence	Total[1]
						(Per cent)						
1961-71												
Newfoundland	–	–	–	1.9	16.3	18.1	3.6	12.7	3.6	43.8	–	100.0
Prince Edward Island	–	–	0.4	0.5	13.1	6.6	3.6	12.2	3.2	41.1	19.2	100.0
Nova Scotia	–	–	–	–	15.5	13.0	–	14.5	6.9	46.3	3.8	100.0
New Brunswick	–	–	–	3.7	18.8	10.5	2.2	12.4	5.0	37.0	10.5	100.0
Quebec	–	–	–	–	10.6	–	3.2	14.0	8.6	51.4	12.3	100.0
Ontario	–	–	–	–	21.3	6.3	3.3	15.4	6.9	38.8	8.0	100.0
Manitoba	–	–	–	3.4	16.1	2.2	0.4	12.4	5.6	48.0	11.8	100.0
Saskatchewan	–	–	–	6.9	9.6	1.2	–	12.4	7.0	46.4	16.6	100.0
Alberta	–	–	–	5.2	11.4	8.5	4.0	13.6	6.0	42.4	8.8	100.0
British Columbia	–	2.4	–	2.4	12.2	9.9	8.6	17.2	6.8	36.6	4.0	100.0
Canada[2]	–	0.4	––	1.3	16.3	6.1	3.8	14.9	7.0	41.8	8.4	100.0
1971-81												
Newfoundland	0.2	1.8	3.9	2.1	23.7	0.8	3.0	16.2	4.8	33.8	9.6	100.0
Prince Edward Island	–	1.2	4.3	0.4	10.4	10.3	5.6	14.5	4.8	40.0	8.6	100.0
Nova Scotia	1.4	1.6	1.8	0.4	13.4	2.6	5.4	20.0	7.1	40.3	6.0	100.0
New Brunswick	0.7	3.1	1.0	0.9	14.3	7.3	4.9	18.0	5.5	36.7	7.6	100.0
Quebec	0.4	0.2	0.1	0.5	15.4	3.3	6.9	19.5	6.1	39.0	8.5	100.0
Ontario	1.0	0.5	0.1	0.1	17.4	3.3	7.3	19.1	8.1	38.5	4.7	100.0
Manitoba	–	0.8	0.8	–	10.7	3.3	9.5	18.0	8.1	41.0	7.7	100.0
Saskatchewan	–	0.5	–	4.8	6.7	11.6	7.2	20.7	7.7	33.1	7.6	100.0
Alberta	–	0.3	––	9.0	8.0	13.8	8.1	17.5	7.3	30.0	5.9	100.0
British Columbia	1.7	1.9	0.5	1.6	10.2	8.2	7.2	17.8	6.8	36.4	7.8	100.0
Canada[2]	0.7	0.7	0.3	1.9	13.9	5.8	7.2	18.7	7.2	36.9	6.6	100.0

1 Excludes industries unspecified or undefined.
2 Excludes Yukon and Northwest Territories.
SOURCE Based on data from Statistics Canada.

Table 11-4

Jobs Created in Major Service Industries as a Proportion of All New Jobs, by Province, Canada, 1971-81

	New-foundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskat-chewan	Alberta	British Columbia	Canada
						(Per cent)					
Community, business, and personal services:											
Education and related services	8.4	7.6	8.5	6.7	6.8	5.1	7.5	6.1	4.3	6.5	5.9
Health and welfare services	10.9	13.2	14.1	11.3	12.6	8.9	15.7	13.9	6.2	9.3	10.0
Religious organizations	0.8	0.6	0.2	0.4	0.6	0.3	0.7	0.3	0.3	0.3	0.4
Amusement and recreation services	1.2	1.5	1.9	1.6	2.1	2.4	1.8	1.3	0.9	1.2	1.8
Services to business management	3.4	4.1	5.4	4.6	6.6	9.9	8.9	6.9	8.7	7.3	8.0
Personal services	0.5	0.6	-0.6	-0.5	0.3	0.3	-1.2	-2.3	0.3	0.1	0.1
Accommodation and food services	5.7	13.9	10.4	12.2	9.8	11.0	12.9	12.7	7.1	9.8	9.9
Miscellaneous services	3.1	4.4	4.2	4.1	4.6	4.0	4.3	4.6	3.4	3.3	4.0
Public administration and defence:											
Federal administration	3.9	2.5	-0.5	1.8	2.9	1.7	0.6	-0.1	0.3	1.4	1.7
Provincial administration	4.4	5.8	4.2	3.4	3.9	1.1	4.7	5.4	3.0	3.8	3.0
Local administration	2.3	1.7	2.8	3.1	2.6	2.3	4.2	4.7	2.8	2.8	2.7
Other government services	-1.1	-	--	--	--	--	--	-	--	--	--
Trade:											
Wholesale trade	4.3	1.2	5.2	5.7	6.4	6.9	6.6	8.9	5.8	5.0	6.2
Retail trade	11.9	15.4	16.7	14.1	15.3	13.9	15.6	18.4	12.3	13.5	14.2
Finance, insurance, and real estate:											
Finance industries	2.4	2.9	3.9	3.0	3.7	4.5	4.3	5.0	3.5	3.7	3.9
Insurance carriers	0.4	0.2	1.0	0.9	0.9	1.1	2.4	2.2	0.7	0.4	0.9
Insurance agencies and real estate	2.0	2.5	2.9	2.2	2.2	3.2	3.2	2.8	3.5	3.0	2.9
Transportation, communication, and other utilities:											
Transportation	1.3	4.4	2.9	0.8	3.4	3.7	7.9	3.9	4.9	4.3	3.9
Storage	0.1	-0.3	0.2	0.2	0.1	0.2	0.2	0.7	0.2	0.2	0.2
Communication	1.3	1.6	2.1	2.3	3.0	2.6	1.8	3.3	2.1	2.1	2.5
Electric power, gas, and water utilities	0.4	0.7	0.6	2.1	1.2	1.5	1.8	1.6	1.2	0.8	1.3

SOURCE Based on data from Statistics Canada.

the 1970s and partly because the initial level of employment in those industries was extremely small. To circumvent the problem of "small numbers," Table 11-4 shows the proportion of jobs created in major service industries between 1971 and 1981 in each province.

In Saskatchewan, Alberta, and British Columbia, the service industry with the greatest proportion of new jobs was retail trade. Retail trade's top-ranking position was to be expected given that this industry was one of the largest employers in the provincial economies. In Manitoba, retail trade, and health and welfare services each accounted for roughly the same proportion of new jobs. In all four western provinces, the next highest ranking industries – accommodation and food services, health and welfare services, and services to business management – all belong in community, business, and personal services.

Our job growth data are disaggregated further to show the distribution of job gains within each service industry group (Appendix Table C-2). In most of them the distribution of job gains across the component industries was very uneven; for example, the bulk of jobs gained between 1971 and 1981 in education and related services in all provinces appeared in elementary and secondary schools. Taking only the three industry groups that accounted for the greatest number of jobs gained during the 1970s, we found that the bulk of jobs gained in amusement and recreation services appeared in miscellaneous amusement and recreation services. In health and welfare services, most of the jobs appeared in hospitals and welfare services. Related health-care institutions also accounted for a substantial proportion of job gains in Manitoba and Saskatchewan. Although the job gains were distributed somewhat more evenly across the component industries in services to business management, relatively more jobs appeared in engineering and scientific services and in offices of lawyers and notaries.

Some National and International Comparisons

The size of the service sector and its growth rate are similar in the West to those in the rest of Canada. They are also similar to those in the United States and much of Europe. The point is important, for the similarity is evidence of at least the possibility that the recent evolution of the West is not as closely linked to the fortunes of the natural resource industries as has been traditionally believed. Thus, although resource developments have recently been much more important in some parts of the West (Alberta, for example) than in others, they may not be *quite* as important as has been thought.

In Alberta, for instance, the percentage of employment in goods-producing industries between 1961 and 1981 declined from 43 to 34 per cent. In Canada it similarly went from 43 to 33 per cent. In Manitoba, the decline was from 40 to 30 per cent; in British Columbia, from 37 to 30 per cent; and even in Saskatchewan – the most natural resource-oriented province of all the West – from 50 to 36 per cent.

The Canadian experience is paralleled by similar shifts internationally (Table 11-5). In the early 1950s, the goods-producing orientation of the employment distribution was most pronounced in the European countries; in West Germany, France, and Norway, employment in the primary sector was considerable, though it was still exceeded by that in the other goods-producing industries. The other goods-producing sector, which is dominated by manufacturing, was largest in the United Kingdom. At the same time, the shift of employment to the service-producing industries in the United Kingdom was under way. Employment in Canada, the United States, and Australia was concentrated more in the service-producing industries. Nevertheless, only in the United States did the latter account for more than 50 per cent of employment. By 1980-81 the shift to services was evident in all countries, though less so in Europe. Again, Canada, the United States, and Australia showed the strongest service orientation. By 1981 the proportion of the labour force accounted for by the service-producing industries was largest in Canada, where the speed of the shift was fastest.

The European data show more clearly than the western, Canadian, or U.S. data that the structural shift under way is basically from goods production of any kind into services; that is, it is not basically from natural resources into manufacturing.

In absolute terms, however, the picture is a bit different. In Canada between 1961 and 1971, only agriculture, forestry, and fishing, hunting, and trapping showed decreases in employment. All other industries, including manufacturing, showed employment growth. Faster-than-average employment growth was recorded in finance, insurance, and real estate; community, business, and personal services; public administration and defence; and trade. Between 1971 and 1981, all industries except agriculture experienced employment growth. Three of the four high-growth industries in the 1960s retained their status in the 1970s: finance, insurance, and real estate; community, business, and personal services; and trade. Thus the structural shift to services in Canada, as in the western provinces, has recently been occurring through differential growth rates across industry sectors. There has been no absolute

Table 11-5

Distribution of Employment in the Goods-Producing and Service Industries, Selected OECD Countries and Selected Years, 1950 to 1980

		Agriculture; forestry; fishing and hunting	Other goods-producing industries[1]	Service industries[2]	Total
			(Per cent)		
Australia	1954	13.4	38.6	48.0	100.0
	1979	6.5	30.9[1]	62.6	100.0
Norway	1950	26.0	35.9	38.1	100.0
	1980	8.4	29.7[3]	61.9	100.0
United Kingdom	1951	5.1	47.7	47.2	100.0
	1979	2.5	37.1	60.3	100.0
United States	1950	12.5	35.6	51.8	100.0
	1980	3.5	29.6	66.9	100.0
West Germany	1950	23.7	43.2	33.2	100.0
	1980	5.8	43.1	51.1	100.0
France	1954	27.5	35.4	37.0	100.0
	1980	8.7	34.5	56.8	100.0
Canada	1951	19.3	34.8	45.9	100.0
	1981	5.3	26.7	68.0	100.0

1 Other goods-producing industries include mining and quarrying; manufacturing; and construction.
2 Service-industries include utilities; wholesale/retail trade; restaurants and hotels; transport, storage, and communications; finance, insurance, and real estate, and business services; and community, social, and personal services.
3 Includes utilities.
SOURCE Based on International Labour Organization, *Yearbook of Labour Statistics*, 1962 and 1981.

decline in employment in either the primary or the goods-producing industries.

This is not true in all of the OECD countries. The number of workers increased in manufacturing throughout the 1950s and the 1960s in all of these countries (Table 11-6). Between 1971 and 1981, however, the number of manufacturing workers actually declined in the United Kingdom, France, and West Germany. Indeed, the fastest rate of decrease in the number of manufacturing workers occurred in the United Kingdom and West Germany, which had the largest proportion of workers in manufacturing throughout the period. Therefore, essentially all of the new jobs created in these European countries were in the service sector. This suggests that the observed job growth in services cannot be dependent on job growth in the goods-producing industries, for there was no such growth. It could still be argued, however, on the basis of this evidence alone, that growth in services was dependent on output growth in the goods industries. That seems to us unlikely, for reasons that will become clear.

Service-sector firms have somewhat different characteristics than manufacturing or resource firms. For example, from his detailed study of the job-creation process in the United States, Birch found that a major role was played by newly established, independent service firms; only a minor role was played by new branches of existing firms, by the expansion of existing branches or firms, or, in some regions, by relocation of firms.[1] Small firms were more likely to expand than contract, while larger firms were more likely to shrink than to grow. As a result, about 60 per cent of all new jobs in the United States were accounted for by firms with 20 or fewer employees. Although all industries contained small, independent firms, substantially more of them were found in service-sector industries, with the result that this sector was the major growth sector in the United States throughout the study period.

The results of a study by the Canadian Federation of Independent Business show that a similar pattern exists in Canada.[2] Using a sample of 7,700 members, the study tracked the growth of firms over the 1975-82 period. The most rapid growth took place in firms with fewer than 20 employees, and the rate decreased with each increase in firm size. Over the same period, the smallest firms – those with fewer than 10 employees – contributed 62.7 per cent of all new jobs, and the youngest firms showed much more

Table 11-6

International Comparison of the Employment Trend in the Manufacturing Industry, Selected OECD Countries and Selected Years, 1950-80

	Year	Number of persons employed
Australia	1954	1,037,634
	1966	1,312,125
Norway	1950	357,689
	1960	358,224
	1970	371,580
	1980	421,000[1]
United Kingdom	1951	8,446,686
	1966	8,614,460
	1979	7,276,000
United States	1950	16,113,479
	1960	18,535,903
	1970	21,936,000
	1980	23,556,000
West Germany	1950	6,806,372
	1961	9,785,026
	1970	10,507,000
	1980	9,106,000
France	1954	4,936,960
	1970	5,551,300
	1980	5,441,000
Canada	1951	1,360,662
	1961	1,489,824
	1971	1,777,000
	1981	2,087,000

1 Includes mining and quarrying; and utilities.
SOURCE ILO, *Yearbook of Labour Statistics*, various years.

vigorous growth than the older firms. The study also found that the services accounted for most of the employment growth, although the contribution made by the manufacturing sector was substantial as well.

All of our data indicate that the conclusions reached about job creation in the United States and Canada would also apply, largely unchanged, to the western provinces. They also have significant policy implications.

Services and Growth in Living Standards

Service sector growth contributes to overall economic growth not only by creating jobs but also by contributing to productivity growth in the economy as a whole. Productivity growth in the service sector has been slow but nevertheless significant. In Canada the service sector probably accounts for close to a third of the productivity growth. Although we have no data, it would be astounding to find differences in this respect between the West and the rest of Canada, for the evolution of service industries in both regions has been remarkably similar.

Since the service sector is so large and growing, living standards are heavily influenced by its efficiency and by the speed at which that efficiency is increasing. Since our definition of economic success turns on the capacity of a province or region to provide higher living standards for its population – and, if possible, without significant out-migration – economic success in the West could in principle depend heavily on productivity growth in the service sector.

Although productivity growth is significant in services, it is slower than in the goods industries. One effect, in a generally inflationary world, is for the prices of services to rise somewhat more rapidly than the prices of goods. This price effect, considered alone, would be expected to reduce somewhat the demand for services, relative to that for goods. The effect is more than offset, however, by a shift in people's preferences towards services and away from goods as their real incomes rise. The upshot is a faster upward trend in both the prices and consumption of services than in those of goods. The tendency for prices of services to rise faster than the prices of goods may give the impression that service industries cannot be increasing in efficiency. The appearance, however, is deceptive. Although prices for services are rising, they are not rising as rapidly as they would without productivity improvements.

Then, too, the widely held perception that the productivity performance of the service industries compares unfavourably with that of the goods-producing sectors may be an illusion. Official productivity measures for some industries do not accurately reflect their performance. A simple, commonly used measure of productivity is output per employed person. For practically all of the finance, insurance, and real estate industry, however, output is measured by labour input, and so productivity is always measured as 1.0, implying zero productivity growth. The same is true of public administration and defence, and for much of community, business, and personal services. Only a small portion of the output of the goods-producing industries is measured in this way. Since most industries are now service-producing, it is important that much-improved measures of productivity in the service sector be developed. Only then will it be possible to identify accurately which industries that are weak performers and those which are strong.

The measurement problem has a qualitative, as well as quantitative, aspect. Current measurement techniques fail to capture improvements in the quality of commodities. Although this is a problem for both goods and services, the magnitude of the problem is arguably greater in the case of the latter since so much of the service sector consists of intangible commodities. These include the provision of information and know-how by medical personnel and engineering consultants; and that of service, in the purest sense of the word, by sales clerks, railway conductors, appliance repair personnel, and so on.

A recent study by Postner and Wesa illustrates the importance of improving productivity measurement in general and for the service industries in particular.[3] Since official measures of certain service industries are not well defined and are subject to considerable improvement, Postner and Wesa used an index of production constructed from a weighted sum of various outputs for the finance, insurance, and real estate industry. Use of this new measure of output led to a substantial upward revision in the measure of productivity growth for this industry, for the 1971-76 period. In theory, the effect of this revision on the measured productivity growth performance of the economy, which would occur as a result of the input-output linkages between the finance, insurance, and real estate industry and other industries, would be substantial.

In spite of the inadequacies of current measurement techniques as they relate to productivity growth in the services, there is no doubt that such growth has been taking place in services, and that this has meant faster growth in living standards. How does this work in detail? Five specific ways in which growth in the efficiency of the service sector contributes to improved living standards can usefully be distinguished.

First, increased efficiency results in lowered costs for the service supplier for a given level of output. These lowered costs are translated partially into a lower price for the service or less rapid price increases than otherwise and partially into higher wages and profits. As a result, higher consumption of that service will be possible without sacrificing other kinds of consumption or saving; that is, higher living standards can be achieved. This process has occurred, for example, in banking services and meals outside the home.

Second, in a similar way, increased efficiency in nonmarket final services will result in lower costs for those services. The three major categories of nonmarket final services are health, education, and public administration (federal, provincial, and municipal government). Lower costs for the supply of these services will mean that taxes and other forms of indirect payments will rise less rapidly than they would have otherwise or that the quality and range of services offered to the final-demand consumer will increase without an increase in taxes. Again, that means better living standards.

Third, the service sector contributes to growth in living standards through the lower costs of final goods for local consumption that result from increased efficiency in the services that form an intermediate input to those final goods. Their contribution to improved living standards is thus indirect. Examples of indirect service inputs are regional transportation systems for locally produced fruits and vegetables and the services supplied by wholesalers, retailers, computer service firms, lawyers, accountants, and architects. Lowered costs for the services used by producers of goods for local consumption enable suppliers of goods to either charge lower prices for those goods than otherwise or to raise prices less if the general situation in the economy is inflationary. The ultimate effect is that this will permit an increase in the consumption of the affected goods without forcing any reduction in the consumption of other goods or services or in savings – again, improved living standards.

Fourth, efficient services as intermediate inputs also lower the costs for goods exported from the region. A very obvious example is the effect that increased efficiency in rail and port services has had in lowering the costs of wheat exported from the Prairie provinces to international markets. Similarly, growing efficiency in electrical utilities reduces costs in the production of petrochemicals. The result is increased regional exports, which in turn lead to higher levels of imports, since dollars are earned by the region to pay for the imports. Higher living standards result. The smaller the region, the more "open" the economy; that is, exports and imports play a larger role in regional economies than in national economies, since it is very unlikely that they will be capable of producing all goods and services internally. An increasingly efficient export sector, an important element of which is an increasingly efficient service sector, is critical under these conditions to growth in the regional standard of living.

Fifth, and finally, increased efficiency in the service sector contributes to overall improvements in the standard of living by reducing the prices, or raising the quality, of services exported directly. Exported services take two forms. The first includes services actually sold abroad – for example, engineering services for a telephone system in the Middle East or a hydro-electric system in Latin America. The second consists of services that are consumed at home but earn currency from outside the region; for example,

travel and tourism services are exports to foreign and out-of-province travellers who consume them on site. Other examples are the specialized education and health services sold to foreign nationals. Lower costs for exported services will stimulate export demand, thus allowing expansion of the imports that go with rising living standards.

Postner and Wesa showed that the impact of some service industries on productivity in other industries is large.[4] They focused upon the identification of productivity growth within industries, as well as upon the transmission of this growth from industry to industry through supplier/customer relationships as well. The authors illustrated the importance of understanding the role played by such linkages in transmitting productivity growth throughout the economy by using the example of five service industries: transportation and storage; communications; wholesale trade; finance, insurance, and real estate; and services to business. Each of these industries is large in its own right, and each delivers at least 40 per cent of its total gross output to intermediate demand. Postner and Wesa determined the overall effect on productivity when the productivity performance of the five selected service industries was increased by a given amount. The theoretical effect of an improvement in the productivity performance of these industries was large, since not only would their own productivity increase, but the productivity of all other industries would increase as well – in some cases, quite substantially.

The work by Postner and Wesa shows the potential for generating a wide dispersion of productivity growth from such growth in a limited number of key industries, many of which are service industries. Their study is important because it illustrates the necessity of refining and improving the measurement of output and productivity growth, particularly in the service sector, which suffers from poorer measurement than the goods-producing sector. Failure to develop improved measurement tools helps to reinforce the commonly held perception that the productivity performance of the service sector is poor. The study also illustrates the far-reaching, positive impact that the service industries have on productivity growth in the economy.

Although we do not have measurements of all of the individual effects, the sum total of the direct and indirect, market and nonmarket, contributions of an efficient service sector to growth in living standards is substantial and increasing in size and importance. The important role played by services has tended to have been overlooked or treated as a residual to goods production. In fact, in our view, the services play a very important role as a vehicle of substantial growth in the economy.

At the same time, nothing in the five ways through which services contribute to overall economic efficiency is unique to services. In manufacturing and other goods-producing industries, the same processes are at work. Efficiency improvements in manufacturing also lower costs for the suppliers of goods for local consumption and for export. The lowered costs translate partially into reduced prices and partially into higher wages and profits. Higher living standards result. Similarly, manufactured goods form intermediate inputs to other goods-producing industries and to service-producing industries. Lowered costs for the suppliers of intermediate goods mean lowered prices for intermediate inputs and lowered prices for the final good or service. Automated manufacturing process equipment and automatic bank teller machines are parallel examples.

The processes and linkages that lead to living standard growth from increased efficiency are in fact identical in both the service and goods sectors. The major difference between the two is relative size. Since the service sector is so much larger than the manufacturing sector, efficiency improvements in the former will have a potentially much larger impact on overall economic efficiency.

Sources of Productivity Improvement

Simply, productivity growth derives from increases in the efficiency with which output is produced; that is, more or better quality output is produced with a given amount of inputs, or the same level of output is produced using a smaller amount of inputs. In either event, the final result is the same: fewer inputs are used for each unit of standardized output. This result can be achieved in several major ways – for example, through increased capacity utilization; higher-quality inputs; technological advances; scale economies; and the improved allocation of resources.

We focus here on three other important sources of productivity improvement – specialization and vertical disintegration; agglomeration economies; and technological change – because they are particularly important for the service industries but tend not to have been taken into account in policy. Hence, the potential for improvement in overall economic efficiency through these three routes is high.

Specialization

Through time, most activities have become increasingly specialized through a process referred to as "disintegration." This occurs when an activity performed by a firm, along with a number of other activities, is split off to be performed solely by a single entity, which may be an affiliated company or an independent firm. The increased specialization

and division of labour that results in the firm that formerly performed the activity and in the newly created entity allow both to raise their efficiency.

The rapid growth in the services to business management industry in recent years is a prime example of how increased specialization has led to the creation of new activities and new jobs. Wholly new types of business, such as computer software, data processing, and business information firms, have grown rapidly in response to technological advances in automation. Traditional industries, such as advertising, grew and changed in order to exploit fully the opportunities offered by new media such as television; changes in telecommunications technology have transformed the communication services industry; and the growth in the size and complexity of business has led to the expansion of other "industries" such as offices of accountants, engineering and scientific services, and offices of management and business consultants.

To some extent, the growth of such producer services represents merely a shift in the location of services. Instead of being performed within companies as ancillary services to facilitate the main line of business, many services are now performed by unrelated companies. But hand in hand with this shift has gone increased specialization. In engineering services, for example, a medium-sized company producing a manufactured good would formerly have kept one or more engineers and/or technicians on staff to deal with engineering requirements that might have arisen occasionally. The engineer's services would not have been needed on a full-time basis, but he or she would have been on full salary, and the engineer's productivity would have been lower than potentially possible. Perhaps to redress this to some extent, the engineer would have been called upon to fulfil other duties for which the proper qualifications were lacking – an apparent improvement in productivity since he or she would have been occupied on a full-time basis. Such would have been an illusion, however, since the engineer would not have performed as well in those other duties as would someone else who was fully trained in those duties.

Today it is more likely that a medium-sized manufacturer, say, will hire outside engineers on a contract basis for specific tasks. The company has access to specialists when required, without having to bear the cost when their services are not needed. And the specialists are left to do what they do best, and only that. Both the company's and the specialist's productivity have improved. In the service sector, the result has been growth in both the level of activity and the range of services offered, and in the service producers' productivity. The productivity of goods producers has grown as well.

Despite the substantial growth in marketed business services, employment in administrative positions within firms has also grown. This reflects the growing complexity of doing business – the increased internationalization of business, the growing emphasis on technology and know-how, and the expanding requirements for dealing with government and labour.

The sum total of this increased emphasis on what is broadly called "services" is reflected in the occupational structure, in which the proportion of the labour force in the traditional "blue-collar" categories has declined and that in "white-collar" occupations increased. Information acquisition, processing, and dissemination have become ever-increasing full-time occupations for a large number of people.

Some important shifts have also been taking place within the service sector itself. In examining shifts in the structure of demand and in the employment structure in seven European countries during the 1970s, Gershuny found that European consumers have, to some extent, been substituting durable goods for purchased services, such as automobiles for public transportation.[5] Gershuny also found that the fastest growth within the services sector was in the producer (business) services category rather than in the final demand category. He therefore argued that a major impetus behind the rapid growth of the service sector in Europe was rapid growth in the producer services. Stanback noted that in the United States the value added in producer services alone – financial, legal, accounting, marketing, management consulting, and communications – exceeded the value added of all manufacturing output.[6] Both researchers contended that higher productivity in the manufacturing and primary sectors may have been possible only because certain highly specialized and strategic services were available to management. In fact, they argued, much of the growth in the value of final demand for manufactured goods has been accounted for by growth in the value added by producer services.

Superficial examination of our data on Canadian employment growth would lead to the conclusion that the trends in Canada parallel those reported for Europe: employment in the services to business industry increased as a proportion of the community, business, and personal services category and as a proportion of total employment from 1971 to 1981, while that in the personal services industry (hairdressers, dry cleaners, shoe repair shops, and so on) declined. Upon closer examination, however, the evidence suggests growth in both business and household services. Employment in amusement and recreation services, a household or personal-type service, grew over the decade as a proportion of total employment. That in accommodation and food

services, used by both businesses and households, grew substantially as a proportion of total employment, as it did in miscellaneous services, which include such activities as automobile and truck rentals, photographic services, and machinery and equipment rentals. Miscellaneous services clearly serve both businesses and households. Trade (wholesaling and retailing) – an intermediate service to business and a final service to households – was a high-growth industry during the 1970s. And, finally, financial services – banks, the insurance industry, and real estate – also showed high rates of employment growth from 1971 to 1981. Again, both businesses and households are availing themselves of financial services, demanding an increasing variety of services, and more of them.

In nonmarket service industries, employment in education declined slightly as a percentage of all services and of total employment; that in health maintained a steady position; and that in public administration increased substantially. The bulk of public administration employment growth occurred in provincial and municipal governments, not in the federal government.

This evidence clearly indicates that it is not just the business services industry that is driving service sector growth; equally important is growth in services to households. And just as the provision of specialized services to business leads to a reduction in business operating costs and to an increase in business efficiency, so do consumer services increase the efficiency with which the average person fills his personal needs. For example, shopping efficiencies are provided by department stores and shopping centres. Computerized billing and banking decrease the amount of time people must spend paying for services rendered. The growth of noncommercial industries, such as education and health systems, has increased the efficiency of society by increasing people's ability to use information and by significantly reducing the impact of now-controllable diseases.

Agglomeration Economies

Two terms used interchangeably to describe the set of efficiencies generated in the environment external to the firm are "agglomeration economies" and "external economies of scale." Agglomeration economies include the wide range of collective benefits that accrue to firms as a consequence of spatial concentration of activities. Essentially, the more businesses and the more they are concentrated together, in a city or city system, the more efficient each of them individually tends to be. A growing, or increasingly urbanizing, population causes cities to grow. That growth permits rising efficiency through agglomeration economies. Living standards then go up. This growth in efficiency occurs in both the service sector and in the sector producing goods for local consumption – that is, in both the nontradable and tradable sectors. The efficiency growth in the two sectors is mutually reinforcing. The contribution to productivity growth made by agglomeration economies is discussed in Chapter 12, which explains the genesis of such economies in more detail and gives measurements of their size and impact.

Technological Change

Productivity growth arises in part from technological change, and there is considerable evidence that the adoption of new technologies – in managerial and organizational, as well as technological, terms – is occurring in the service industries and, in some cases, rapidly. Examples of this process abound: containerization in transportation; automation in offices; and computerization in warehouses. Often the impact of new technologies in the service industries is to increase the range and quality of services offered rather than to increase output; however, measurement techniques currently in use only partially capture those nonphysical effects. They can, nevertheless, mean considerable improvement in the "product" sold by the service firm.

By supplying an improved product package to the market, demand is stimulated, which in turn stimulates investment and a new round of growth in the economy. In *The Bottom Line*, the Economic Council urged both public and private service industries to make concerted efforts to improve the process of adoption and diffusion of promising new technologies.[7]

Services and Employment Growth

Over the 20 years from 1961 to 1981 services accounted for about three-quarters of all new jobs. The significance of the dominance of the service sector in both the level and growth of employment needs to be related to our discussion of the theories of western growth in Chapter 4. At first, this dominance may seem to favour the "growth and evolution" view that an initially resource-based economy will eventually evolve away from dependence on resources. By that same token, the evidence may seem to go against the "growth and retrenchment" view that growth can proceed only as long as natural resources are growing. Not so.

In the growth and retrenchment view, growing efficiency in the resource sector will be needed if a resource-dependent region is to maintain living standards that are competitive with those of other regions and thereby retain its population. Growing efficiency in natural resources will imply slower

employment growth in that sector than in services (if productivity grows more slowly in the latter, as is the case), and this is what we observe. Alternatively, in the growth and evolution view, an increase in consumer preferences for services over goods and efficiency increases in the service sector together also imply slower-growing employment in natural resources than in services. The data we observed are therefore consistent with both views.

Indeed, the message of the data is not to allow us to distinguish between the two views, but rather to show, first, that they do not rule out the growth and evolution view, and second, that the substantial and increasing employment in services puts a heavy premium on seeking to improve efficiency in the service sector, if living standards are to continue to improve.

The question arises as to whether the past growth of jobs in the service sector can be expected to persist in the future, if, as we think is possible, the rate of growth in the natural resource sector is slower than before.

The answer depends on one's theory of how the economy works, and how the job creation process works. On what we think are plausible views about this, views that we think would command significant but by no means unanimous support among economists, the answer is a qualified yes.[8] The main qualification is that service sector productivity must improve rapidly enough to allow the annual rate of increase in output per employee in the western service sector to exceed slightly that in the rest of Canada. That is, total productivity growth in services and goods combined should be equal to total productivity growth elsewhere. Given that the service sector today carries so much weight, this should not be an impossibly demanding requirement. Better productivity performance in the service sector will be necessary for as long as the growth rate of resource output per employee remains lower than it used to be.

In the past, service-sector productivity growth rates in the West seem to have matched those elsewhere. This as a minimum should be achieved in the future. Implementation of our recommendations on productivity growth in the service sector, together with increasingly important agglomeration economies, should ensure that the required faster productivity growth in services will be achieved.

At first, it may seem paradoxical that rapid productivity improvement is needed to ensure rapid job growth. Often, productivity improvement is expected to eliminate jobs, because a given output can be produced with fewer people. The flaw in this view, at least in the case of a small economy as open to trade as that of the West, is that it ignores numerous "feedback" effects from productivity improvement on sales and incomes. These feedback effects mean that output rises when productivity rises and enough that unemployment is avoided. Let us stress again, at this point, that this optimistic conclusion, and the reasoning following that underlies it, would command wide but by no means unanimous support in the economics profession.

To understand how unemployment is avoided through feedback effects, consider first the case of a productivity improvement in the service sector that is not matched by a similar productivity improvement outside the region. Several feedback effects will emerge from such improvement. In goods industries that use numerous services such as transport, distribution, services to business, government services, and financial services, costs are lowered by the productivity improvement in services. The goods industries can then expand output with favourable job-creation effects. In the service industries themselves, the increased demand from goods industries will partially, and possibly wholly, offset the labour-saving effect of the productivity improvement.

Disposing of the extra goods output is not a significant problem. The West has always succeeded in the past in selling, at world prices, all that it is willing and able to produce profitably at those prices. Economists express this last idea by saying that the West is a "price taker" for most of the outputs of the goods sector. At most some temporary price reductions, or improvements in other aspects of the terms offered to buyers, will be required to achieve higher penetration of the necessary markets, whether for exports or for import substitutes.

Another set of feedback effects is on services going to final consumers. Higher productivity permits price reductions, lower rates of increase in prices, or lower tax costs per unit of services supplied in the case of nonmarket services. These price and tax-cost effects stimulate consumption of the corresponding services; that has job-creating effects that also help to offset the negative impact of the labour-saving aspect of productivity improvements.

During the period of transition to the new equilibrium, the regional balance of payments and trade change. There is a temporary export surplus as the enhanced efficiency in the export and import-competing sectors takes effect. That surplus creates a monetary inflow, which prevents monetary stringency that might otherwise tend to inhibit the expansion. To the extent that some monetary stringency still remains, in that a considerable part of the output increase in the economy occurs in the nontradable sector, it is ultimately obviated by a reduction in costs

in the nontradable sector or by a lower rate of price increase there.

At the final equilibrium, all the effects, direct and indirect, of the productivity improvement in services have made their influence felt. A key characteristic of this final equilibrium is that the unemployment rate is no higher, and may be lower, than it was before the productivity change, for the various output effects create more jobs than the labour-saving effects destroy. Another characteristic of this equilibrium is that the relative price of services in comparison with goods is down. The prices of services need not actually have fallen; rather, the rate of inflation of service prices may have been temporarily lower than it would otherwise have been.

A third characteristic of the new equilibrium is that output of all goods and services, including exports, is higher. Living standards are therefore higher. There are also higher imports because of the higher living standards. The real value of wages is higher relative to those outside the region. This may be because the growth of money wages in the region was faster than outside for a time, while prices inside the region temporarily rose more slowly. Or it could be that the rate of increase in money wages was temporarily lower than outside (though still positive), while price increases relative to those outside the region were much lower, allowing relative real wages to go up. The source of these beneficial effects on real wages, however they occur, is a temporary boost in the demand for labour. Output expansion is the cause of that in the service sector and also in the goods sector to the extent that technological change in the service sector spills over into it. The output effect is so strong that demand for labour in the economy rises temporarily, despite the productivity improvement. With total labour supply limited, abstracting for the moment from increases in population due to natural increase or immigration from other regions, this puts pressure on real wages and raises them.

So far, we have looked at the case where productivity improvement in the service sector is not matched by similar productivity improvement outside the region. The key effects in our view of the way the economy works are that unemployment has not changed or has fallen from what it was before, while living standards have risen in comparison with those elsewhere. Under these circumstances, the rise in living standards will attract migrants. The resulting increase in population, pressing upon the limited supply of resources and other fixed factors of production, will then gradually restore living standards to the same level as outside the region or to a level no different from the one that existed elsewhere before the technological improvement in the service sector. Thus the productivity improvement in the service sector has finally led to a greater number of jobs, with no change in the relative standard of living.

It is a straightforward matter to modify this conclusion for the more realistic situation where productivity improvements are occurring in the rest of the nation and the world. In that case, a similar chain of analysis shows that productivity improvement in the service sector is required to avoid job losses rather than create jobs. The rise in living standards that the productivity improvement causes prevents out-migration rather than stimulates in-migration.

We can now respond to the question posed near the beginning of this section. When productivity improvement in the natural resource sector is down compared with the past, it should be possible to compensate for that through slightly more rapid productivity improvement in the service sector. If this can be achieved, there will be no drop in the relative standard of living and hence no drop in the relative growth of jobs or population. Moreover, there will be no rise in the rate of unemployment. In sum, the past growth of jobs in the service sector can be expected to persist, and indeed accelerate slightly, even though the rate of growth in the natural resource sector is likely to be slower than before.

Informatics

Our view of the long-term prospects for continued strong growth in both productivity and job creation in the service sector is thus very positive. Our optimism is not based on "theory" alone. Practical examples of the dynamism of the service sector abound. In this section we look at one in detail, namely the introduction of microelectronics and informatics. The experiences here illustrate how growth and economic evolution based upon one new generic technology can contribute substantially to growth in the economy.

Most western industrialized countries expect that much of the growth in the service sector over this decade will be based upon rapidly evolving microprocessor-based technologies and informatics, which include electronic data processing, telecommunications, and electronic office systems technologies and the technologies that integrate these.[9] Informatics technologies have already touched upon, and transformed, many familiar business activities and have the potential to transform them all. For example, the microprocessor has allowed banks to expand their everyday services to customers so that they now have the option of holding daily-interest bank accounts or of withdrawing funds at any time by using automatic teller machines. Retail stores are using point-of-sale registers and universal product codes to keep track of inventory requirements, to

authorize credit when charge cards are used, to analyse consumer spending habits, and so on.

Much of the service sector is involved in the provision or processing of information – namely, informatics. Firms specialized in data processing and computer software do just that. New firms specializing in business data bases and international business "intelligence" are being established and can function efficiently using microprocessor-based technologies. New types of insurance services are also available because of the microprocessor. The list is endless, and these are activities that already exist. What new activities will come into being in the near future are limited only by entrepreneurial imagination and are beyond our ability to forecast with any certainty (in fact, even beyond the ability of most specialized futurists – certainly among the world's oldest service professionals). The main point to bear in mind is that informatics is not a narrowly based industry; instead, it is a generic term that cuts across all industries for which the commodity is information and the occupation is "white-collar."[10]

Microprocessor and information-based technologies are not resource-based, having instead many of the characteristics of "footloose" industries. Such industries enjoy more locational flexibility than other industries, since they are not involved with the processing of raw materials: transportation costs of materials – information – are not a constraint on location, partly because of advances in telecommunications. Nevertheless, most of the footloose, information-based industries still find that they benefit enormously from the agglomeration economies offered by information-rich regions such as metropolitan areas.[11] In this sense, they may not, in fact, be as footloose as they first appear to be.

Since for a growing sector of the economy the most important resource is information and since much information is generated by the interaction of large groups of people and the synergy that is characteristic of large urban areas, the western provinces are well positioned. British Columbia, for example, is located on the Pacific Rim, which includes countries that are growing rapidly in response to advances in microprocessor- and information-based technologies. To the south, the western United States are also growing rapidly, partly as a result of growth in the information-related service industries. Though such industries are footloose, they are much attracted to locations that offer agglomeration economies, including a large and varied service sector. British Columbia contains several large urban areas and enjoys the additional advantages of environmental and recreational attractiveness. It therefore has many of the features that appeal to newly developing industries, which would contribute to provincial growth.

Other characteristics that attract information-related industries and other new service industries are a lively research community associated with universities or independent research institutions, cultural and recreational facilities, health and education facilities, and a well-developed retail sector – all of which help companies to attract and retain a skilled labour force. Cities in the other western provinces have many of these characteristics and would be attractive locations for the increasingly sophisticated service industries. The development of new activities brings with it an increase in investment, employment, income, and demand.

The Role for Public Policy

The picture that emerges, whether the scale of analysis is provincial, national, or international, is that growth in the service sector has contributed importantly to growth in living standards and to the creation of the vast majority of new jobs over the last couple of decades. Furthermore, analysis of current economic trends points to a continuing important role for services in the growth of living standards and employment throughout the 1980s and beyond. These trends are not revolutionary; instead, they are the result of the natural evolution of what many have termed "postindustrial" societies.

There are important lessons to be learned by policy makers everywhere. The pre-eminence of goods production in the economy is giving way to a service orientation, and economic development strategies based exclusively upon goods-producing industries are seriously incomplete. Comprehensive strategies must recognize the changing character of postindustrial societies and take advantage of the changes.

Consciously or unconsciously, many industrial development policies contain an implicit anti-service industry bias. A glance through the handbook entitled *Assistance to Business in Canada* quickly indicates that a firm will find it much easier to obtain assistance if it makes a tangible good than if it provides a service.[12] Assistance to small business and to technological change are two broad areas where government traditionally steps in to improve the functioning of the economic system. We believe that there is at least as much beneficial scope for acting in the service sector as in the goods sector. Yet policy has hardly touched the service sector. We do not pretend to have examined exhaustively all the federal, provincial, and municipal industrial policies and tax laws; thus we do not offer recommendations on specific

provisions. The issue, however, is of sufficient concern to warrant our advocating that governments "pay attention." Therefore,

36 We recommend that the federal, provincial, and municipal administrations in Canada take a hard look at all of their current industry and business policies with a view to identifying unexploited opportunities, especially in the area of aid to small business and the promotion of technological change, in order to create greater efficiency in the service sector.

This, of course, is not a specifically "western" recommendation. There is nothing specifically western about most service industries. At the same time, service industries are extremely important in the West, and the implementation of this recommendation could certainly help the westerners; as a sort of bonus, it would help the rest of Canada as well.

The next area of potential action is of a more specifically western nature. As noted, there is some reason for concern that the traditional natural resource exports of the West may not grow as rapidly in the future as they did in the past. Changes in the service sector that might facilitate growth in exports are therefore of particular importance. We are especially concerned that the cost wedge between prices at the production point for exports and prices received in international markets be narrowed as much as possible. We believe that there remains the potential to do so through faster application of technological change in the service sector, particularly in the railway, post, and pipeline systems, and in shipping. We therefore make in a slightly different way, and in a western context, a recommendation similar to some we made earlier in *The Bottom Line*;[13] that is,

37 We recommend that the federal and provincial governments more actively promote technological change in those parts of the service sector in the West which affect the wedge between the prices received for exports at the point of sale and the prices received at the point of production.

Studies of the job-creation process have identified new, small service sector firms as a major source of new jobs. Often, new firms experience serious problems in acquiring capital for start-up and expansion, partly as the result of inefficiencies in the venture capital and equity markets. Although some federal funds are available, they tend to be footloose – that is, available for use anywhere in Canada. Services, however, are distinctly urban in orientation and thus, by definition, are local, with the benefits of development of the service sector accruing largely to specific cities. It may be time, therefore, for city governments to play a more active and direct role in facilitating the establishment and growth of local service-sector firms. This is of particular relevance to the western provinces, since dynamism in the service sector would help to compensate for some reduced dynamism in the resource sector. Discussions with individuals in the provincial public and private sectors and with federal officials in the West have also led to the view that urban municipalities should become more actively involved in service-sector growth and economic development.

When devising local strategies, city governments should bear in mind, first, that the shift to services represents a shift to local production and, second, that some parts of the service sector fill not only the local and regional demand but also foreign and out-of-province export demand.

Two examples illustrate how city governments can facilitate growth in the service sector. First, it is common practice for cities to focus their efforts solely upon attracting goods-producing firms. City governments should widen such efforts to encompass service-sector firms. We are not, however, recommending that municipalities step up the expensive game of in-fighting and making costly concessions to firms in order to sway their locational decisions. Exaggerated concerns about narrowly self-serving issues such as the tax base can create inefficiencies and exact costs upon the whole economy. What we are suggesting is that the municipal level of government, as well as the provincial and federal levels, play an active role in identifying distortions that work against the establishment and growth of service-sector firms and in eliminating them as far as possible. Something as simple as broadening the targets of advertising campaigns designed to inform potential entrepreneurs of the facilities and public services that are available in a particular city to include service firms as well may prove to be highly successful without increasing the costs.

Second, the West is well placed to tap the growth potential of the rapidly developing countries of the Pacific Rim by offering specialized exportable services – for example, in the fields of health care and education. Another exportable service is engineering for turnkey projects abroad. By encouraging local engineering firms to cooperate and form local consortia, cities in the western provinces could share in good business relations abroad. The Montreal-based engineering industry provides a model of success in this regard. In sum,

38 We recommend that the municipal level of government become actively involved in the identification of development opportunities in the service sector and that it design local strategies to facilitate the establishment and growth of service-sector firms.

Broad transitions do not always occur smoothly. Although time and space place constraints upon the depth at which questions of adjustment are treated here, we must point out that the continuing transition from a goods-producing to a service-based economy has associated implications for the nature of work, the occupational structure, and the distribution of income. Careful management of change and the equitable distribution of work and income are prerequisites for the smooth transition to a service-oriented economy. The question of training and retraining are central to the smoothness with which adjustment takes place, from the perspective of the people currently employed in existing businesses and from the perspective of encouraging the formation of new businesses. The requirements for both the employees in new businesses and the new business entrepreneurs themselves will increasingly be related to microprocessor and information-based skills, either directly or indirectly. It makes little sense to engage in discussions about the effect of new technologies on employment and skills and at the same time fail to provide an adequate number of places to be trained. Therefore,

39 We recommend that provincial governments adopt as a major element of their manpower and small business development policies the provision of locally accessible training centres for microprocessor and information-based technologies.

In closing, we should like to reiterate the importance of our first recommendation – namely, to "pay attention." It seems to us that there is an extremely large gap between policy towards, and the reality of, the service industries. This is as true for the country as a whole as it is for the West. We believe that the service industries are critical to the future growth of living standards and employment opportunities in the West. We urge, therefore, that governments at all levels give these industries the degree of policy attention that is appropriate in light of their very great, and rapidly growing, importance to the economy.

12 Agglomeration Economies

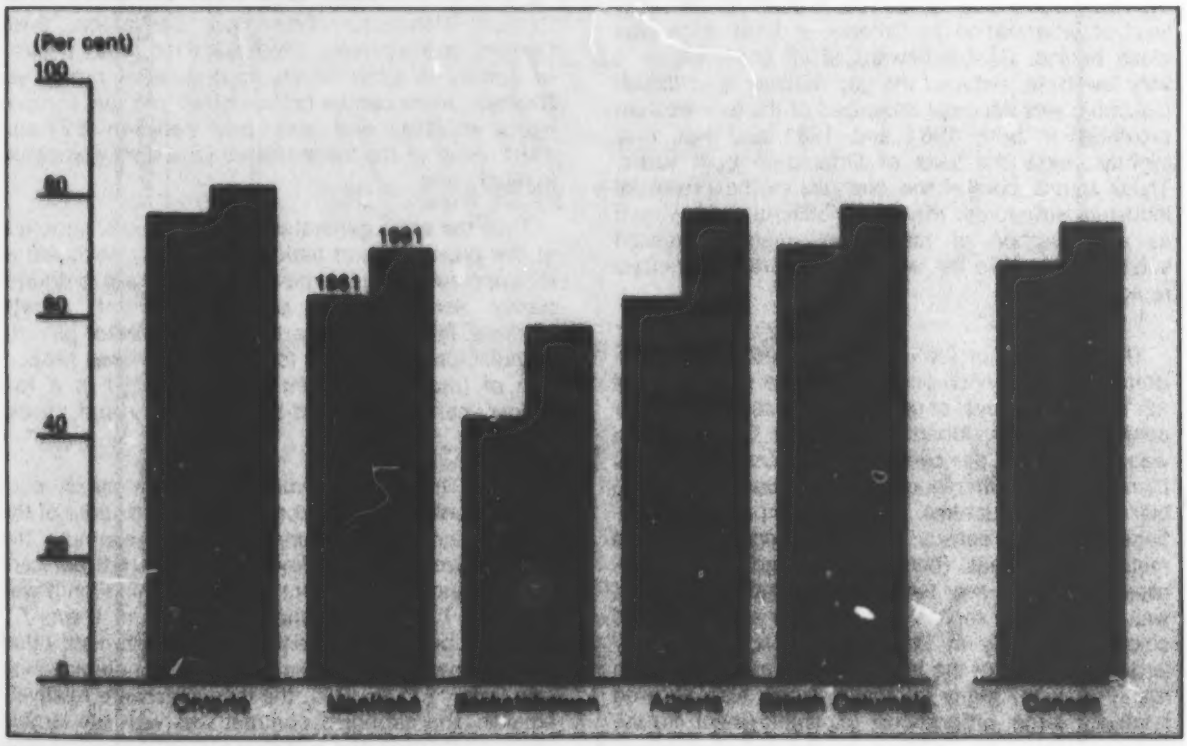
The term agglomeration economies refers to the advantages of large urban areas as places to work and live. It has been argued that for certain types of goods producers and for most service producers the most efficient location is an urban area, and that productivity increases as urban size increases. Urban areas are essentially agglomerations of activities. As their size increases, the economies associated with agglomeration also increase. The larger economies allow increased efficiency among producers of goods and services, with the result that existing firms are more efficient; and new, small firms can survive because they have access to the advantages offered by the range of activities found in large urban areas. Such areas are the incubators of new, small firms, which are frequently service sector firms and thus create most of the new jobs in the economy.

Our concern with the size of the benefits associated with agglomeration economies arises, of course, from our desire to promote growth in living standards. Since firm efficiency is in part influenced by agglomeration economies, improved living standards can be realized through policies designed to augment, or even create, agglomeration economies.

Just as productivity growth is a dynamic concept that implies change, so is the concept of agglomeration economies, for they arise in part from growth in

Chart 12-1

Urban Population as a Proportion of Total Population, Ontario, the Western Provinces and Canada, 1961 and 1981



SOURCE Based on data from Statistics Canada.

the size of cities. If all cities were equal in size and parallel in economic structure, none would offer more advantages than others with respect to efficiency. Some cities, however, are larger and more diversified relative to others, and this leads to differences between cities in the size of agglomeration economies and in the efficiency of firms. Medium-sized cities are more efficient than smaller ones, and larger cities are more efficient than medium-sized ones, although sometimes substantial inefficiencies arise as cities become extremely large. Larger gains will therefore be realized more quickly if policy focuses on encouraging growth and diversification in the large cities.

Services: An Urban Phenomenon

Perhaps more than any other activity, services are an urban phenomenon or, perhaps more appropriately, the urban phenomenon consists largely of the concentration and growth of service activity. The most rapidly urbanizing provinces in Canada since 1961 have been the three Prairie provinces – Manitoba, Saskatchewan, and Alberta. In 1961 all three were much less urbanized than Ontario (Chart 12-1). By 1981 Alberta had reached almost the same level of urbanization as Ontario, and Manitoba was close behind. Saskatchewan, which started from a very low base, reduced the gap substantially. British Columbia was the most urbanized of the four western provinces in both 1961 and 1981 and was only slightly below the level of Ontario in both years. These trends parallel the changes in the provincial industrial structures: Prairie agricultural employment as a proportion of total employment decreased substantially, while the services proportion increased rapidly.

That the economies of urban areas consist predominantly of service activities can be seen in Table 12-1. Since the level of urbanization exceeded 70 per cent in Manitoba, Alberta, and British Columbia and was close to 60 per cent in Saskatchewan in 1981, there was little difference between urban and provincial industrial structures, with a few important exceptions. In most census agglomerations or census metropolitan areas (hereafter referred to as metropolitan areas), over two-thirds of total employment was found in the service industries. In a few selected cities, particularly in British Columbia, a relatively large proportion of the labour force was employed in manufacturing. Many of these areas also showed relatively large proportions of employment in the primary industries. These were the resource-based towns, such as Flin Flon, Trail, Prince Rupert, and Port Alberni, where primary processing of forestry and mining products provided a substantial part of the employment.

For over half of the metropolitan areas, 75 per cent or more of the jobs gained between 1961 and 1971 and between 1971 and 1981 were in the service sector (Table 12-2). At the same time, the vast majority of cities also experienced some growth in their manufacturing jobs. For the most part, the job gains accounted for by services were relatively smaller in forestry and mining centres such as Trail and Port Alberni, where manufacturing and the primary industries created relatively more jobs.

Within the service sector, two industries were the major sources of job growth: community, business, and personal services; and trade. The community, business, and personal services category consists of a great variety of more precisely defined industry groups, and not all of them showed strong employment growth between 1971 and 1981 (Table 12-3). The main job generators over the decade were health and welfare services, and accommodation and food services. In some cases, the third-ranking industry was education; in others, services to business management. Relatively large proportions of jobs were generated by services to business management in Calgary, Vancouver, Edmonton, Saskatoon, Swift Current, and Winnipeg, which were the major centres of activity in each of the four western provinces. Similarly, trade can be broken down into two components: wholesale and retail trade. Between 1971 and 1981, most of the trade-related jobs were generated in retail trade.

Thus the same general trends in industrial structure at the provincial and national levels are observed in metropolitan areas. Urban economies are predominantly service-based, and employment growth consists, in very large part, of service sector growth. Manufacturing accounts for only a very small proportion of total employment growth, except in a few predominantly resourced-based forestry and mining centres.

Taking the unemployment rate as a measure of stability reveals the economic volatility of some of the resource and manufacturing cities. For example, the unemployment rate in Powell River was 6.8 per cent in 1971 and 12.3 per cent in 1981; in Flin Flon it was 24.8 and 7.8 per cent; and in Port Alberni, it was 7.3 and 13.2 per cent, respectively. Although most other cities experienced increases in the unemployment rate from 1971 to 1981, the increases were relatively smaller. The strongest contrast was with the largest service-oriented cities – Vancouver, Victoria, Calgary, Edmonton, Saskatoon, and Regina – where the

Table 12-1

Distribution of Employment, by Industry Division and Metropolitan Area, Western Canada, 1981

	Primary industries	Manufacturing	Construction	Transportation, communication, and other utilities	Trade	Finance, insurance, and real estate	Community, business, and personal services	Public administration and defence	Total[1]	Services as a proportion of total
					(Per cent)					
British Columbia										
Vancouver	2.4	14.0	6.5	10.5	18.7	7.1	31.8	5.7	100.0	73.7
Victoria	2.8	6.7	7.2	6.1	15.3	5.4	34.2	19.0	100.0	80.0
Kelowna	6.6	12.6	12.2	5.6	20.0	5.5	29.9	4.7	100.0	65.7
Kamloops	5.3	9.5	9.7	10.9	19.3	5.0	30.4	7.4	100.0	72.9
Chilliwack	10.5	10.5	8.5	4.8	16.7	4.3	24.6	16.2	100.0	66.6
Nanaimo	5.7	13.6	9.5	8.9	19.9	4.9	27.8	6.3	100.0	67.8
Port Alberni	15.5	31.6	3.8	5.6	12.7	2.7	20.7	4.7	100.0	46.3
Prince George	3.5	17.0	8.6	11.3	19.7	4.6	26.6	6.1	100.0	68.3
Trail	14.1	31.4	3.6	6.3	13.3	3.2	22.0	4.7	100.0	49.4
Vernon	6.3	15.8	8.5	8.1	19.0	5.0	29.2	4.7	100.0	66.0
Courtenay	11.5	6.9	9.0	5.8	15.6	4.4	27.0	17.2	100.0	69.9
Powell River	10.3	33.2	5.7	5.8	10.4	3.3	23.9	4.1	100.0	47.6
Prince Rupert	6.8	27.7	6.1	10.2	11.5	3.7	23.3	8.4	100.0	57.1
Terrace	8.1	30.4	7.1	7.8	13.8	2.8	20.7	6.7	100.0	51.8
Alberta										
Calgary	9.3	9.4	11.3	8.4	16.5	7.2	29.9	5.2	100.0	67.2
Edmonton	3.6	10.9	10.3	9.3	17.8	6.2	29.8	9.6	100.0	72.7
Medicine Hat	12.0	10.8	11.8	7.5	20.4	4.0	23.7	7.1	100.0	62.7
Saskatchewan										
Saskatoon	4.7	9.2	7.3	8.5	20.4	5.3	35.8	6.7	100.0	76.8
Regina	2.1	8.7	6.8	10.4	19.6	8.0	29.5	12.7	100.0	80.3
Moose Jaw	5.1	6.3	7.5	10.5	17.5	3.6	31.5	15.5	100.0	78.6
Prince Albert	7.9	7.5	7.1	8.7	18.0	4.0	30.3	13.7	100.0	74.6
Swift Current	11.6	5.3	6.5	9.0	23.8	4.6	30.1	6.8	100.0	74.4
North Battleford	7.2	5.3	7.5	8.2	21.4	4.1	35.9	7.5	100.0	77.1
Manitoba										
Winnipeg	1.1	16.5	4.4	11.9	18.5	6.3	29.7	9.1	100.0	75.5
Portage La Prairie	13.9	8.7	5.4	5.5	16.7	4.0	28.7	15.0	100.0	69.8
Flin Flon	36.3	11.5	2.4	5.5	11.9	2.4	23.5	4.8	100.0	48.1
Thompson	27.0	9.1	2.6	9.4	13.6	3.7	22.9	9.1	100.0	58.7

1 Includes a small percentage of workers for whom the industry is unknown.

SOURCE Based on a special tabulation from Statistics Canada.

Table 12-2

Distribution of Jobs Created in Each Decade, by Industry Division and Metropolitan Area, Western Canada, 1961-81

	Primary industries	Manufacturing	Construction	Transportation, communication, and other utilities	Trade	Finance, insurance, and real estate	Community, business, and personal services	Public administration and defence	Total[1]	Services as a proportion of total
					(Per cent)					
1961-71										
British Columbia	1.4	14.0	7.0	9.8	17.8	8.6	39.4	1.9	100.0	77.6
Vancouver	2.6	8.4	7.0	7.2	18.1	5.8	31.6	19.3	100.0	82.0
Victoria	3.9	13.8	14.1	8.0	22.6	7.2	27.4	2.9	100.0	68.2
Kelowna	3.2	8.9	15.2	10.6	24.0	4.1	27.7	6.2	100.0	72.7
Kamloops	..	..	..	..	..	..	..	..	..	..
Chilliwack	0.7	16.9	8.1	11.6	21.2	5.6	28.8	7.2	100.0	74.3
Nanaimo	16.1	36.2	4.7	5.8	13.1	2.1	19.2	2.7	100.0	42.9
Port Alberni	7.1	18.9	7.6	14.3	17.5	4.5	24.8	5.3	100.0	66.4
Prince George	17.4	41.3	5.5	2.1	10.1	2.1	21.1	0.5	100.0	35.8
Trail	3.6	1.5	11.4	13.3	25.2	6.2	34.0	4.9	100.0	83.6
Vernon	..	..	..	..	..	..	..	..	..	..
Courtenay	..	..	..	..	..	..	..	..	..	..
Powell River	5.8	–	6.6	23.3	17.2	4.5	32.0	10.7	100.0	87.7
Prince Rupert	..	..	..	..	..	..	..	..	..	..
Terrace										
Alberta	7.3	11.9	8.4	5.7	11.6	7.5	46.1	1.5	100.0	72.4
Calgary	4.2	10.5	7.1	7.8	14.3	5.9	41.1	9.2	100.0	78.2
Edmonton	0.7	–	–	–	24.7	2.5	72.1	–	100.0	99.3
Medicine Hat										
Saskatchewan	3.1	10.8	2.4	4.5	16.0	5.6	55.8	1.9	100.0	83.7
Saskatoon	0.9	10.0	–	7.2	9.5	9.0	46.3	17.1	100.0	89.1
Regina	–	–	–	–	–	3.5	34.5	62.1	100.0	100.0
Moose Jaw	5.0	20.5	0.3	–	19.2	4.5	38.4	12.0	100.0	74.2
Prince Albert	9.8	3.5	7.3	2.8	13.0	6.8	42.0	14.9	100.0	79.5
Swift Current	–	6.7	–	–	20.6	12.1	34.6	26.0	100.0	93.3
North Battleford										
Manitoba	–	17.8	1.5	3.7	12.6	6.6	50.4	7.4	100.0	80.7
Winnipeg	0.5	9.9	–	–	11.8	10.0	67.7	–	100.0	89.6
Portage la Prairie	..	..	..	..	..	..	..	..	..	..
Flin Flon	..	..	..	..	..	..	..	..	..	..
Thompson										
1971-81[1]										
British Columbia	–	8.2	6.1	9.6	19.1	9.1	40.9	7.1	100.0	85.7
Vancouver	–	2.7	9.5	4.1	13.6	6.4	46.1	17.5	100.0	87.8
Victoria	–	12.8	12.4	4.4	21.7	6.0	36.8	5.8	100.0	74.8
Kelowna	–	9.0	6.9	9.8	19.9	7.1	37.5	9.7	100.0	84.0
Kamloops	–	9.5	11.0	5.8	19.9	7.4	34.7	11.8	100.0	79.5
Chilliwack	–	11.1	12.2	6.5	23.5	6.6	33.5	6.5	100.0	76.7
Nanaimo										

Port Alberni	-	24.5	3.5	0.6	15.3	6.9	37.6	11.6	100.0	72.0
Prince George	-	16.1	9.4	8.8	23.0	5.2	30.7	6.8	100.0	74.6
Trail	20.7	-	5.4	4.8	16.3	8.2	33.3	11.2	100.0	73.8
Vernon	-	17.7	9.5	7.0	19.3	6.6	35.2	4.7		
Courtenay	-	8.2	15.3	7.1	19.4	7.0	37.0	6.0	100.0	76.5
Powell River	-	-	14.8	11.9	10.7	8.0	44.5	10.7	100.0	85.2
Prince Rupert	-	26.8	10.1	-	9.0	9.8	35.5	8.8	100.0	63.1
Terrace	-	22.0	11.6	7.1	16.0	2.6	25.4	15.3	100.0	66.4
Alberta										
Calgary	5.4	8.1	14.8	8.3	17.0	9.3	33.7	3.3	100.0	71.7
Edmonton	-	10.0	13.5	8.9	18.3	8.6	32.7	8.0	100.0	76.5
Medicine Hat	0.4	6.2	21.7	5.8	28.6	6.5	25.4	5.5	100.0	71.8
Saskatchewan										
Saskatoon	-	8.0	10.4	7.2	23.4	7.4	37.4	6.2	100.0	81.6
Regina	-	6.4	10.4	8.9	19.6	12.3	33.7	8.8	100.0	83.2
Moose Jaw	-	3.1	16.1	11.6	22.8	3.8	33.5	9.1	100.0	80.8
Prince Albert	-	-	11.1	8.9	18.2	6.8	34.2	20.8	100.0	88.9
Swift Current	-	6.8	5.3	1.1	38.5	8.4	39.7	-	100.0	87.8
North Battleford	-	7.5	14.3	8.8	25.8	4.0	33.3	6.4	100.0	78.2
Manitoba										
Winnipeg	-	9.7	2.2	12.0	16.2	9.1	41.0	10.7	100.0	88.0
Portage la Prairie	-	18.4	9.8	0.7	31.7	6.1	32.4	0.9	100.0	71.8
Flin Flon	33.0	20.0	2.2	5.6	8.1	3.3	27.8	-	100.0	44.8
Thompson	-	-	-	18.7	-	4.2	39.6	37.5	100.0	100.0

1 The 1971 data were adjusted to reflect city boundaries as drawn in 1981.
SOURCE Based on census data and a special tabulation form Statistics Canada.

Table 12-3

Share of Trade and of Community, Business, and Personal Services in Jobs Created, by Metropolitan Area, Western Canada, 1971-81[1]

	Trade		Community, business, and personal services							
	Wholesale	Retail	Education	Health and welfare	Religious organizations	Amusement and recreation	Services to business management	Personal services	Accommodation and food	Miscellaneous services
	(Per cent)									
British Columbia										
Vancouver	6.2	12.9	6.3	10.2	0.2	1.2	10.9	-	8.8	3.7
Victoria	2.1	11.5	8.6	13.2	0.7	1.0	7.8	0.2	11.1	3.6
Kelowna	5.7	16.0	6.2	7.7	0.8	2.6	4.9	1.6	9.6	3.4
Kamloops	8.0	11.9	6.7	8.4	0.5	0.5	5.5	1.0	11.5	3.4
Chilliwack	5.2	14.7	6.8	11.5	1.4	-	3.7	-	10.2	2.0
Nanaimo	3.6	19.9	5.1	9.9	0.4	1.2	6.5	-	9.1	2.1
Port Alberni	0.2	15.3	5.1	14.9	-	1.2	1.2	-	13.1	3.1
Prince George	7.0	15.9	6.8	7.5	0.4	0.4	5.5	-	7.9	2.5
Trail	-	19.1	3.1	14.3	1.4	-	0.7	-	15.7	3.4
Vernon	5.0	14.3	4.9	9.5	0.3	0.9	5.6	1.6	9.7	2.8
Courtenay	3.4	15.9	6.0	7.7	0.3	1.3	5.6	0.6	12.4	3.2
Powell River	-	12.5	11.3	6.8	-	2.7	3.0	-	15.7	5.0
Prince Rupert	3.2	6.1	10.3	10.0	1.1	0.3	7.2	-	4.2	4.2
Terrace	6.1	10.1	9.1	5.4	0.3	1.0	2.9	-	7.5	0.8
Alberta										
Calgary	5.7	11.3	3.8	5.5	0.2	0.8	13.7	0.6	6.0	3.2
Edmonton	6.7	11.7	4.2	6.7	0.4	0.9	9.4	0.1	7.0	4.0
Medicine Hat	7.6	21.0	4.4	3.9	0.6	0.6	4.5	0.7	8.6	2.1
Saskatchewan										
Saskatoon	8.3	15.0	4.4	8.2	1.0	1.2	8.3	-	11.8	3.2
Regina	6.0	13.6	5.2	11.1	-	1.1	6.5	-	7.1	3.7
Moose Jaw	3.0	19.3	5.2	16.5	-	0.8	4.1	-	11.0	0.9
Prince Albert	3.8	14.4	5.4	6.6	0.9	0.1	5.5	-	9.6	6.2
Swift Current	8.8	29.8	1.9	12.2	-	2.3	8.4	-	16.8	6.9
North Battleford	0.9	24.9	5.1	11.0	1.3	-	4.2	-	7.9	6.8
Manitoba										
Winnipeg	4.4	11.8	5.7	12.1	0.7	1.5	8.4	-	10.0	3.7
Portage la Prairie	5.1	26.8	12.3	5.4	-	0.5	6.1	-	7.5	2.3
Flin Flon	3.0	5.6	1.5	13.0	1.1	3.7	1.1	0.7	5.9	0.4
Thompson	0.8	-	16.2	18.3	1.7	0.4	1.3	1.7	-	4.2

1 The 1971 data were adjusted to reflect city boundaries as drawn in 1981.

SOURCE Based on a special tabulation from Statistics Canada.

unemployment rate decreased rather than increased over the period.

Agglomeration Economies

The concept of agglomeration economies has traditionally held an important place in industrial location theory, from the time of its earliest formulation by Alfred Weber to the present. Such economies act to concentrate industries within any given region. Commonly, agglomeration factors are divided into three types: *large-scale economies within a firm*, dependent upon the enlargement of the firm's scale of production; *localization economies* for all firms in a single industry at a single location, dependent upon the enlargement of the total output of that industry at that location; and *urbanization economies* for all firms in all industries at a single location, dependent upon the enlargement of the total economic size of that location, for all industries taken together.[1]

Agglomeration economies are usually divided into two groups: those accruing to businesses, and those accruing to households. Each group is composed of a large and highly diversified range of activities. Business agglomeration economies derive from: access to specialized business services; access to sources of capital; labour market economies (larger pools of, and more varied, skills; superior training facilities; better-organized placement services); larger supplies of managerial and professional talent, and the presence of activities likely to attract these; the opportunities for specialization offered by a large market; the existence of a relatively well-developed infrastructure (highways, railroad lines and terminals, airports, and utilities); economies in water supply and other public sector services; and communication economies. Though many of these types of economies are qualitative in nature, they add up to reduced costs. Household agglomeration economies consist of a wider choice in jobs, shopping, and housing; higher-quality educational facilities, transportation services, hospitals, and so on; and access to a wider range of leisure and entertainment facilities.[2]

Some economies are a function of urban size and consequent economies of scale in the provision of public services, such as transportation systems, and sewage and water systems. Beyond a certain size of town, for example, bus services are economic; beyond a certain size of city, rapid transit systems are economic. Other economies are a function of proximity, or accessibility, to labour skills, information, customers, suppliers, and so on. Small firms generally have more to gain than large ones from locating in an existing urban complex, since the latter can create economies internally, whereas the former must rely more heavily upon external economies.

While much has been written about agglomeration economies, attempts to measure such economies have not met with great success, partly as a result of the difficulties encountered in the measurement of qualitative factors.[3] Perhaps the most important agglomeration economy arises from the synergy generated by large urban areas – by the complex interactions of the myriad of actors on the urban scene – but so far the phenomenon has not been easily measurable. It is generally agreed, however, that agglomeration economies make an important contribution to the increases in productivity associated with growth in urban areas.

Agglomeration economies affect productivity in four major ways. First, they affect productivity directly by increasing the rate of technological change. Second, they allow efficiency improvements in urban areas through economies of scale in the provision of public services. Third, they attract industry and capital into a region or metropolitan area. Fourth, they influence the decision of households about whether or not to migrate. The existence and influence of agglomeration economies thus have important implications for development prospects in the western provinces.

Traditionally, urban and regional development policies have focused on the attraction of manufacturing industries. But many changes in the economic environment in recent years have eroded the efficacy of such an orientation. The product life cycle has shortened, as greater emphasis has had to be placed on innovation to increase international competitiveness; firms have become more and more internationally oriented, leading to an increase in the number of branch plant operations; and technological change in manufacturing has led to slower employment than output growth. Services show less sensitivity than goods production to downturns in the economy, and cyclical fluctuations in employment growth in the service sector are considerably smaller than those in the goods-producing sector.[4] An additional implication of the structural shift to services is that more stable, longer-term growth will arise out of development policies that recognize their central place in the economy in contrast to traditional policies that treated services as parasitical or residual. That explains our concern with the relationship between productivity in the service industries and agglomeration economies.

Agglomeration Factors and Canadian Industry

With population and economic activity concentrating increasingly in large urban areas, we need to know what role agglomeration economies play in this

process; which agglomeration factors are generally important; and which are important only to specific industries. Answers to these questions will help us to identify the characteristics that will contribute to economic development and growth in the western provinces. To find these answers, we measured the effects of several agglomeration characteristics.

Two of the three components of agglomeration economies were measured by single variables: scale economies were defined as the average number of employees per firm in each industry in each city; and localization economies were defined by the location quotient, which measures the relative concentration of each industry in each city.[5]

The third component – urbanization economies – was treated somewhat differently. In order to capture the variety and complexity of urbanization economies, a number of related, yet distinct, city characteristics were measured. Since these characteristics were related, it was possible to summarize them into a smaller number of factors, using factor analysis. Factor analysis groups variables according to common underlying relationships, each group corresponding to a single concept. In our analysis of agglomeration economies, data were collected for 11 variables. Some measured aspects of large cities; some, the education level of the city labour force; and some, aspects of the employment situation. Factor analysis was then applied to those variables, and a total of four important factors were identified. These four factors contained 72 per cent of the information contained in the original 11 variables (Table 12-4).[6]

A composite city characteristic is measured by each factor. Consider Factor 1. High values for this factor occur with high values for the percentage of the labour force in services to business, the percentage of the labour force in finance industries, the city population, and the total number of establishments operating in the city.[7] This factor captures the idea that city size, both in population and amount of business activity, is closely related to the availability of professional, business-related activity. High values for Factor 2 depend on low values for the percentage of the labour force unemployed and high values for the total labour force participation rate. When unemployment is low and labour force participation is high, the local economy is healthy; businesses are operating at high capacity; and demand is high. Factor 3 depends on high values for the percentage of the labour force in professional occupations, the percentage of the labour force in postsecondary teaching, and the percentage of the labour force with some university or with a university degree. Factor 3 clearly measures the skill or educational level of the city labour force. Factor 4 is a bit of an outlier, depending mainly on the percentage of the labour force in leisure and recreational activities.

The basis of our analysis was the 110 urban areas designated as either a census agglomeration (CA) or census metropolitan area (CMA) in 1981. Data were collected for 1971 and 1981 for a sample of manufacturing industries; data for services were available

Table 12-4

Factor Analysis of Urban Agglomeration: Factor Loadings, Wholesale Industry, Canada, 1971

	Factor			
	1	2	3	4
Total participation rate	.22	.90	.06	.06
Percentage of labour force unemployed	.01	-.89	-.11	-.05
Percentage of labour force:				
With some university	.35	.13	.83	.07
In professional occupations	.50	.19	.56	.02
In postsecondary teaching	-.08	--	.86	.03
In leisure and recreation	.12	.10	.08	.87
In services to business	.58	.24	.24	-.30
In finance industries	.65	.13	.39	.10
City population	.94	.03	.04	.13
Population density	--	-.01	--	.77
Total number of service industry locations	.93	.01	--	.13

SOURCE Estimates by the Economic Council of Canada, based on data from Statistics Canada.

only for 1971. The purpose of the analysis was to explain differences in the productivity of firms across cities, measured by value added per employee for manufacturing firms and by gross trading margin per employee for service firms. Industries in the analysis were necessarily selected by the availability of metropolitan-level data rather than by any theoretical expectations as to which industries would be more, or less, influenced by agglomeration economies. Some industries, such as textiles, and rubber and plastics, have been found to be influenced a great deal by agglomeration economies.[8] We could not include these and some other industries in our analysis because sufficient city-level data were not available. Nevertheless, some general trends are indicated by the analysis, suggesting some useful policy directions.

Before discussing the analysis itself, its purpose must be clearly stated so that false expectations are not raised. Although we wished to explain variations in industry productivity across large urban areas, our focus was rather narrow: it was to determine the role played by agglomeration economies in such variations. Other factors that may also influence industry productivity differences across cities (and regions), such as access to physical inputs, differences in kinds of output, firm ownership, and wage and transportation costs, were not taken into account. Hence we cannot fully explain the productivity variations. The amount of variation explained ranged from 57 per cent in the retail industry to 5 per cent in amusement and recreation, in the service sector portion of our analysis, and from 49 per cent in the printing and publishing industry to essentially zero in the furniture and fixtures industry in the manufacturing sector analysis. Since the primary purpose of our analysis was to identify, and measure, agglomeration economies rather than to explain intra-industry productivity variations, these results are sufficient, permitting us to make inferences about growth and about policies to improve it.[9]

At the same time, it is clear that research into agglomeration economies is not yet very well advanced. Few researchers have tackled the question of agglomeration economies in its entirety because of the complexity of the relationship between individual industries, the urban system, and specific cities with specific characteristics. Our contribution to advancing the state of the art consists of examining the relationship between agglomeration economies and the service industries. Traditional economic theory focuses on what to produce and how much of it; we concentrate on where to produce, in big towns or small.

The Service Industries

The six service industries included in the analysis were wholesale trade; retail trade; amusement and recreation services; services to business management; personal services; and accommodation and food services.

Taking urbanization economies first, we found that gross trading margin per employee in the wholesale trade, personal services, services to business management, and retail trade industries increased as urban size and access to special business services increased, although, in each case, the impact of this variable was quite small. For example, in the case of wholesale trade, a doubling of the population at the mean from 140,487 people to 280,974 people would lead to an increase of 0.24 per cent in gross trading margin per employee – a small increase indeed. Similar orders of magnitude with respect to the increase in gross trading margin per employee were also found in the other industries. These results mean not until cities reach a very large size is there any significant increase in productivity as a direct result of that growth. Such a small effect is in accordance with what we would expect from the literature, where it is argued that significant economies arising from large city size are not realized below populations of several hundred thousand or even 1 million. Further research is in progress by the Council on the question of whether the advantages of size increase indefinitely or whether diseconomies become dominant at very large sizes.

A buoyant local economy, indicated by low unemployment and high labour force participation, had a strong positive influence on productivity in retail trade and a lesser, though still important, influence on gross trading margin per employee in personal services and in the accommodation and food industry. High levels of employment mean brisk business for shops, hairdressers and barbers, and restaurants, so that sales and service personnel are not standing by idly. To illustrate, our estimates show that a 20 per cent reduction in the mean level of unemployment in 1971, from 9 per cent to 7 per cent, would have had the effect of increasing productivity in retail trade by approximately 2.7 per cent.

As the educational level of the local labour force rose, the gross trading margin per employee in wholesale trade and in the amusement and recreation industry increased. At the mean, the percentage of the metropolitan labour force having some university education or a university degree was 12.8 per cent. If this were to increase to 19 per cent, according to our estimates the gross trading margin per employee in wholesale trade would increase by approximately 10.5 per cent; that in amusement and recreation, by

approximately 8 per cent. In the retail trade industry, contrary to expectations, the relationship between gross trading margin per employee and the educational level of the labour force was negative, though only marginally so.

The influence of internal economies of scale, as measured by the average number of employees per service business, was quite pronounced in the retail trade industry. At the mean, there were five employees per retail location.[10] If the average size of retail locations were to increase to eight employees from five (a deceptively large 60 per cent increase), retail trade productivity is estimated to increase by about 20.6 per cent. The positive impact of internal economies of scale is by far the largest in the retail trade industry compared with the other variables in the analysis.

The impact of localization economies was expected to be positive. This expectation was confirmed for wholesale trade, where we estimated that an increase in the mean relative level of concentration from 0.7 to 1.0 would increase the gross trading margin per employee in wholesale trade by about 9 per cent.

The second part of our analysis of the relative importance of the various agglomeration factors in the service industries focused upon differences between the western provinces and the rest of Canada. Overall, the results for the West did not differ much from those for the rest of Canada. The impact of the various agglomeration factors on the gross trading margin was positive, as expected. Again, the sole exception was the retail industry, where the effects of the education factor and localization economies were negative in the West.

Generally, the magnitude of the impact of the agglomeration factors was slightly larger in the West. In personal services, while increases in average firm size led to higher gross trading margins per employee in the rest of Canada, no influence of scale economies was found in the metropolitan areas of the western provinces. In contrast, scale economies were evident in accommodation and food services and in services to business management in the western provinces but not in the rest of Canada, indicating that in the 1970s scope still existed in the West for increasing the productivity of those industries by encouraging the growth of firms.

There is some evidence that regional factors were also at work in some industries. Our results show that in the wholesale trade industry, businesses in the western provinces were more efficient than those in the rest of Canada and by a wide 74 per cent margin. This may reflect one or many of various factors such as differences in transportation systems, labour costs, inputs, or degree of specialization.

The Manufacturing Industries

For comparison we looked at six manufacturing industries: food and beverages; the wood industries; furniture and fixtures; printing and publishing; metal fabricating; and nonmetallic mineral products. This particular sample of industries deserves some comment.

First, each industry group represents an aggregation of related but more narrowly defined industries, some of which may operate with quite different locational factors. In other words, while some of the components of the food and beverage industry – as an example – may react to agglomeration economies, others may not. When aggregated, the influence of agglomeration economies may be muted. Because of the limitations of publicly available data, little could be done about this aggregation problem.

Second, the very nature of some of the industries points to a stronger resource than urban orientation. Such is the case for parts of the food and beverage and the wood industries, where access to raw materials is more important than access to agglomeration economies.

Third, some are ubiquitous, being found in all communities because they produce perishable products and/or because the minimum size of the market required by each business is very small. In the case of ubiquitous industries, it is likely that the influence of agglomeration economies will begin to show at smaller city sizes than was the average for the sample used in our analysis. For example, in food and beverages, a city of 100,000 people could support a number of efficient bakeries. At the industry level of our analysis, the influence of agglomeration economies will not be detected, although for each individual outlet such economies may be quite important. Nevertheless, though imperfect, the sample did allow us to identify the relative importance of agglomeration factors across industries.

As in the case of the service industries, the purpose of the analysis was to explain the differences across cities in value added per employee with reference to the roles played by: economies of scale in the manufacturing establishment, as measured by the average number of employees; localization economies, defined as the location quotient for each industry in each city; and urbanization economies, which consisted of three components – urban size and access to specialized business services, access to educational facilities and an educated labour force, and a component identifying areas of low unemployment and high labour force participation. We analysed data

for 1971 and 1981, and again we identified any differences that existed between the western provinces and the rest of Canada.

The printing and publishing industry is arguably the most metropolitan-oriented industry of the six manufacturing industries, requiring a large market and usually being found in only a few major urban regions. Agglomeration economies explained 49 per cent of the variation between cities in value added per employee in printing and publishing in 1971 and 35 per cent in 1981. In both the West and the rest of Canada in 1971, the urbanization economies were the most important factors, particularly the factor identifying the low unemployment and high participation locations, that can be interpreted as a proxy for economically healthy regions with high capacity utilization rates. The differences between the West and the rest of Canada are interesting. Whereas in the West, value added in the printing and publishing industry in 1971 increased as city size and access to specialized business services increased, no significant role was played by this agglomeration factor in the rest of Canada. At the same time, as the location quotient for this industry increased in the West, value added per employee decreased. Again, no discernible effect of this type was found in the rest of Canada.

In 1971, then, the critical location size for an efficiently operating printing and publishing industry in western metropolitan areas had still to be reached. At that time the industry would have benefited from larger urban size and from support in the form of access to specialized business services, but would have suffered from any increase in the number of firms in the industry in western metropolitan areas.

By 1981 the situation in the printing and publishing industry had changed somewhat. No longer did the value added per employee decrease in the West as industry concentration increased and no longer were the benefits from increases in urban size and access to specialized business services apparent, indicating that the western metropolitan areas had reached the critical minimum size required to sustain an efficient printing and publishing industry. Instead, access to a market characterized by professional occupations and low rates of unemployment predominantly explained variations in value added per employee across cities.

In the metal fabricating industries, agglomeration economies had an impact in 1971 but none in 1981. In both the West and the rest of Canada, value added per employee increased as unemployment decreased locally and as the participation rate increased – a proxy for high rates of capacity utilization. Also, in the rest of Canada, access to a pool of unskilled labour provided efficiency benefits to metal fabrication plants.

Although no effect of agglomeration economies was detected in the case of the nonmetallic mineral products industry in the rest of Canada in 1971, two agglomeration factors were found to be important in western metropolitan areas. Value added per employee increased in this industry as unemployment decreased and labour force participation increased and as access to educational facilities and an educated labour force increased. No effects of agglomeration economies were detected for either the West or the rest of Canada in 1981.

The results for the wood industries for 1971 show that value added per employee increased as urban size and access to specialized business services increased. By 1981 the advantage of being located in a large metropolitan area was no longer apparent; instead, internal economies of scale in the form of larger plant size were important, indicating that greater productivity advantages were generated by internal rather than external factors.

Similarly, in the furniture and fixtures industry, in neither 1971 nor 1981 was a relationship found between value added per employee and localization and urbanization economies. In 1981, however, increases in average plant size were found to contribute to increases in value added per employee.

None of the analysis detected any role for agglomeration economies in explaining metropolitan variations in value added per employee in the food and beverage industry. This reinforces our earlier comment that more disaggregated analyses are necessary, particularly in the case of food and beverages, in order to separate the resource-oriented and ubiquitous components of this industry.

With the exception of a single industry, no systematic regional effect was detected; that is, we did not find that the West was intrinsically more, or less, efficient in an industry than the rest of Canada. The single exception was the nonmetallic mineral products industry, which includes producers of clay products, cement, concrete, glass, and other products. In both 1971 and 1981, value added per employee was substantially higher for producers in western metropolitan areas.

The Overall Results

Most of the practical work on agglomeration economies has focused upon manufacturing. Our results confirm that for some manufacturing industries – particularly those less closely tied to primary resources, such as printing and publishing – agglomeration economies, predominantly of the urbanization

economies type, can play a positive role in industry productivity performance.

Our extension of the analysis to include the service industries is new. Commonly, the service industries are considered only as being part of agglomeration economies rather than as beneficiaries of such economies. In extending our analysis to the service industries, we have had to rely on what would normally be considered outdated information – that is, data for 1971. We believe our results are valid, nevertheless, and we point to some important conclusions.

First, agglomeration economies have an important influence on productivity in the service industry in the West and in the rest of Canada. The relationship between the urban-size factor and gross trading margin per employee was positive in all of the six service industries, as expected, and of major importance in four of them. The employment factor is a proxy for the vitality of the local economy and high rates of capacity utilization; it was positively related to the gross trading margin in five of the six industries and was important in four of them. A positive sign was also expected on the factor measuring the educational level of the labour force variable; this expectation was confirmed for all but the retail industry, and the variable was important for three of the six industries. The relationship between localization economies and the gross trading margin per employee was positive in some cases and negative in others. It was of significance only to the wholesale industry, where its impact was positive as expected, and to the retail industry, where its impact was negative. The impact of internal economies of scale was positive in all but one industry and important to three, particularly to retail trade.

Second, those agglomeration economies which were important to the service industries in the West tended also to be important in the rest of Canada. Greater variation and weaker results were found in the manufacturing industries.

The picture that emerges, then, is very much like the one described in Chapter 11. When we compare the western region to the national economy, we find that the service sector is roughly the same size and that the productivity in that sector is influenced in similar ways by similar factors – namely, by agglomeration economies.

The direction should be fairly clear. Services are a large, rapidly growing sector of the economy, providing widely diversified employment opportunities. The prospects are that services will continue to play this role. Productivity growth in services is an important part of overall economic growth, and large urban areas are efficient locations for service activities. By providing external economies, they act as incubators of new firms and industries. Those same economies also contribute to improved productivity performance by existing firms. Urban growth, the attraction of sophisticated service activities, and the development of richly diversified urban environments, then, should form an important part of the package of development strategies used by urban and regional development planners and policy makers.

Of course, there are limits to the extent to which continuing increases in urban size and complexity give rise to agglomeration economies. In fact, sometimes vehement arguments erupt over the size of city that represents the ideal maximum or minimum.[11] Although increases in urban size and complexity do give rise to agglomeration economies, diseconomies of large size and congestion may also develop and begin to offset the positive efficiency effects.

Urban diseconomies affect different industries in different ways and to varying degrees. Some plants, such as assembly operations, require fairly extensive production and shipping facilities. The high cost of land and the high density in urban cores mean that they are unsuitable locations, and many plants have relocated to urban fringe areas and nonmetropolitan locations. Other activities, primarily those which are office-oriented, can afford to pay for high-cost central locations because of the benefits of centrality and of accessibility to clients and information.

The idea of urban diseconomies stems in part from analyses of those service industries under public jurisdiction, such as transportation systems, water and sewage systems, utilities, and police. Just as in the case of a firm producing a number of products, a city faces different costs for the provision of public services. Each may benefit from economies of large-scale production. For example, the cost of building a sewer line to a new housing development would be cheaper, on a per-household basis, if 100 households were serviced within a confined area than if there were 10. But after some point, which will vary with the service, diminishing returns set in, just as in the case of manufacturing plants. Diminishing returns may arise from congestion and overloading of the system. Since the rate at which economies of scale are realized and the point at which diseconomies become larger than the positive economies both vary by service, the "ideal" or efficient city size will vary, depending upon the type of service under consideration. Even within service types, the minimum and maximum efficient size will vary, depending upon whether, for example, a public transportation system is based upon buses or whether it is a rail-based, rapid transit system. Futhermore, for most public services, the critical factor is not just population size

alone but, rather, that in combination with population density and rate of population growth.

The problems of the very largest metropolitan areas – New York, for example – are well known. Unlimited urban growth can lead to undesirable changes in the quality of life – increased air pollution, congestion, noise, the decay of city cores as suburban areas become more desirable, and so on. Similarly, much smaller cities that grow more rapidly than envisaged by planners can face problems of inadequate supplies of existing housing and of serviced lots for new housing, strains on social support systems, congestion and noise, and a host of others. Calgary, for example, experienced strained public services during the 1970s when high rates of in-migration occurred in response to the oil boom.

Thus we are not advocating unlimited urban growth of any and all types and at any rate of growth. Besides in the next 10 or even 20 years, it is highly unlikely that any metropolitan area in the western provinces will reach the huge sizes at which serious urban diseconomies set in. Thus we believe that the advantages of more urban growth for the development and expansion of agglomeration economies will benefit city residents, workers, and businesses.

The Role for Public Policy

Growth in the size of the service sector and improvements in its productivity performance are important for employment growth and for improvement in living standards in the western provinces, as well as the rest of Canada. In Chapter 11, three sources of productivity improvement in the service industries were highlighted: specialization, technological change, and agglomeration economies. This was not because they are the only sources of productivity improvement in the service sector but because they have tended to be overlooked by policy makers; therefore, their potential contribution is large. Here we consider the role that public policy can, or should, play in the generation and growth of agglomeration economies.

In most economies, the largest cities are the most efficient, the most economically stable, and the most successful in attracting new activities. In the western provinces, an important component of regional development policy in recent years has been the preservation of small communities, variously referred to as "the stay option," balanced regional growth within provinces, or small-community development. One problem faced by all regional and economic development planners is that they must balance often conflicting social, cultural, and economic goals. Policies to preserve communities sometimes serve the social and cultural goals to the neglect, and even the detriment, of economic goals.

Much of the western region has a strong agricultural base, and its cultural and social roots are deeply rural. But, at the same time, there is a will to diversify and to participate in the vast array of other economic activities. New technology and consumer preferences are changing the nature of existing activities and creating new ones, as they have always done. They, too, are generated to a large extent, by the interaction of people, varied activities, and flows of information. In such a context and with the added consideration that productivity growth in the largest and fastest-growing sector of the economy – namely, services – is desirable, the western provinces should recognize that too much emphasis on preserving small communities could have economic costs. Therefore,

40 We recommend that, in determining their regional development policies, the western provinces take due note of not only the social value of small towns and rural life but also the economic benefits to be obtained from encouraging growth and diversification in larger cities.

Our conclusion that faster and more stable economic growth is generated by larger rather than smaller cities is not inconsistent with having sufficient population outside the cities to exploit western natural resources fully. Some have a legitimate concern about "populating the land," particularly those parts of the western provinces where population density is very low. The view that settlement and development of all subregions is desirable must not, however, be taken to the extreme – that is, to the point of arguing for the equal distribution of population within all provinces. For the full utilization of resources, rural development – including activities to support the resource-based population – is appropriate. But for the largest proportion of economic activity, larger cities promote growth in efficiency through agglomeration.

The question of what it is about larger cities that generates efficiency benefits to business and to inhabitants is complex, since it is the interweaving of factors that is important. Our results point to three important factors: urban size and access to specialized business services; local economic buoyancy, characterized by low unemployment and high participation rates; and the presence of an educated labour force.

To a certain extent, the health of the local economy is out of the hands of local and regional planners, reflecting instead the national and international situation. At the same time, however, we

observed earlier that the larger, more diversified, more service-oriented cities tended to be more economically stable than the more resource-based cities. Important to the attraction of a skilled labour force and population growth in general is the ambiance of a city, and whether it offers to its inhabitants an interesting, diversified, attractive environment in which to work and live. The task of shaping an attractive city rests very clearly with local and provincial planners. And it is as culturally and socially valuable as the maintenance of a rural way of life. Indeed, that task is perhaps more important, since the potential for the development of a sterile urban environment is arguably greater, because social networks often develop less easily in larger cities, and particularly in those experiencing rapid in-migration. Synergistic effects arise as much out of qualitative as out of quantitative factors. Some examples of qualitative city characteristics are the existence of cultural facilities; sports facilities; recreation facilities; parks and green areas; and special public events. Therefore,

41 We recommend that general economic development funds be used in the West in part to subsidize the development of new cultural, social, and recreational facilities and the improvement of existing ones.

In *The Bottom Line*, the Economic Council stressed the important role played by technological change in productivity growth and recommended that provincial funds be allocated to provide information that would speed up the efficient diffusion of new methods of operation in the nonmarket industries falling within provincial or municipal jurisdiction.[12] New technologies in this sector, as in all sectors, include new and improved equipment, processes, and management and organizational methods applied both in Canada and abroad. The acquisition of information on new technologies can be expensive and time-consuming, requiring the maintenance of information and data bases, travel, pilot projects, and so on. Information collection and dissemination can bring collective benefits and if done cooperatively would eliminate wasteful duplication of effort. We think that cooperation between municipalities in collecting and exchanging information would be beneficial. The process need not, and probably should not, involve the federal government. Therefore,

42 We recommend that an Interurban Technology Information Group be set up. Its mandate would be to collect, and disseminate to its members, information on innovative practices in use in municipal management and in the provision of urban public services in Canada and abroad. The Group would be supported by contributions from municipal members. The cost to members would be small, on an individual basis, relative to the benefits that would be derived from information on innovation in municipal affairs.

Universities and government research laboratories are centres that collect and process information, and such information is used to produce new knowledge from basic research and new and improved applications of that knowledge. The presence of universities and special research institutes adds to the attractiveness of a city and can provide a core of academic researchers that draws other professionals. Often, however, the ties between universities, research laboratories, and the wider community, particularly the business community, are weak, diminishing the extent to which the former can act as a catalyst to local development. Many opportunities arise out of closer university/industry ties: through contract research, the universities can act as a source of innovation, business renewal, and job creation when new firms are spawned; contract research can provide a source of funds for researchers at a time when general government funding is being cut back; more outside contact will increase awareness on the part of researchers of the current needs of local business; arrangements can be made to share expensive, specialized equipment that neither one can afford on its own; industry can provide a practical milieu for the education of students and, at the same time, benefit from access to a supply of lower-cost skilled labour. We reiterate, too, that it is not just manufacturing that shares such mutual benefits with universities and government research labs; the service industries do so as well.

There is an important catalytic role to be played by local governments in bringing together the private sector and the public research sector. Examples of some activities that would work towards this end are "industry days" at local universities and research institutions; public lectures on topics of direct interest to local business; the publishing of summaries of research projects that are under way; the maintenance and distribution by the city of up-to-date directories that would include the names of businesses operating in the city and the surrounding region, along with a list of the products and services they sell; and the setting up, on a formal basis, of cooperative university/industry research institutes. Therefore,

43 We recommend that municipal economic development departments adopt as one of their primary development tools the fostering of close, direct links between the local business community, labour groups, local universities, and research institutions.

A major portion of new jobs are found in the service sector and result from the birth of new, small firms. Large urban areas are attractive to such firms

because they provide a large market and easier access to finance capital. Large urban areas are also an attractive location for innovation activities, for many of the same reasons. Risk and uncertainty tend to increase with distance from major metropolitan areas.[13] The key role played by new service-sector firms and innovation-based firms in economic growth should form a central focus of urban development policies. Barriers to the establishment of such businesses, in the form of unduly restrictive zoning by-laws, inhibit their formation and growth. Care should be taken to have adequate amounts of retail and office space available at reasonable cost. Failure to provide adequate amounts of land in core areas and at other nodal points, zoned for office and retail use, results in the bidding-up of land prices to the point where the growth of information-intensive business activities is constrained. Therefore,

44 We recommend that urban governments in the western provinces examine current zoning practices with a view to ensuring that such practices do not inhibit the establishment and growth of important service industries, such as specialized business services, financial intermediaries, information-based services, and specialized medical and educational facilities.

Our final comments are directed to the federal government. Existing data on the service sector, on a geographically disaggregated basis, are appallingly inadequate and out-of-date. The data required to analyse service-sector productivity at the city level (and services are overwhelmingly an urban phenomenon) are available for 1971, but no later. As we have shown, the sector is large and rapidly evolving; industries that did not even exist in 1971 are now important sources of employment and business formation. Particularly from the perspective of regional development, it is essential that we have information on where which businesses are forming and growing. Therefore,

45 We recommend that Statistics Canada undertake to conduct surveys of business activity in the service sector with a view to collecting data on business location, size, income, and costs. At a minimum, such surveys should be conducted every five years.

Conclusion

The analysis and discussion here and in Chapter 11 have led us to some strong conclusions. First, much of the service sector represents unexploited opportunities, especially for productivity growth; a shift in emphasis to services, in economic development strategy, could bring significant economic benefits. Second, we call for a new role for municipalities; services are an urban phenonenon, drawing upon the economies that arise from agglomeration. Municipalities can, and should, play a direct role in fostering growth in the sector. Although there is nothing in these two rallying points that is unique to the West compared with the country as a whole, we wish to reach western policy makers in particular, in order to suggest to those who still think solely in terms of manufacturing that advantages can accrue from a wider view.

13 Manufacturing

Growth in several important natural resources is slowing down, and many believe that services cannot grow fast enough to maintain satisfactory economic performance under these circumstances. Can manufacturing growth compensate for slower resource growth?

The role to be played by growth in services or manufacturing in maintaining performance can be easily misunderstood. Their task is not gargantuan. Considerable resource growth is going to persist despite the slowdown. What is at issue is a deceleration of growth, not a leveling-off or decrease. To compensate, services or manufacturing, or both, would have to continue to grow rapidly if a substantial slowdown in the aggregate growth rate were to be avoided. But neither services nor manufacturing has to grow so as to replace natural resource output or even to replace the annual growth in natural resource output.

In discussing the growth prospects for manufacturing with westerners, we were struck by their scepticism. There was a widespread conviction that the West is too distant and too small ever to become an important manufacturing centre. If "important" means important enough to replace resources, we share that scepticism. But if important simply means important enough to keep on growing at past rates, or moderately faster, despite the resource slowdown, we do not share that scepticism. Growth of this magnitude in western manufacturing seems very likely to occur. Several different lines of evidence and reasoning have led us to this conclusion.

First is the evidence of past growth. Table 13-1 tells some of this story. Over the 54-year span from 1926 to 1980, manufacturing output per capita in Ontario and Quebec increased by roughly 3.5 times. On the Prairies, growth was much faster. Manufacturing increased by 4.3 times in Manitoba; 6.5 times in Alberta; and 8 times in Saskatchewan. In British Columbia, growth was a little slower than in central Canada; output per capita only tripled. From 1960 to 1980, the pattern of faster Prairie growth persisted. Manufacturing output per capita grew 92 per cent in Manitoba, 119 per cent in Alberta, and 126 per cent in Saskatchewan. The rate of growth in British Columbia was, again, much slower than on the Prairies.

Table 13-1

Value of Manufacturing Output per Capita in Central and Western Canada, Selected Years, 1926-80

	Central Canada		Western Canada			
	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
			(1981 dollars)			
1926	955	1,308	486	118	297	971
1930	1,077	1,407	534	160	312	949
1935	762	1,160	493	95	211	817
1940	1,128	1,665	532	178	297	1,009
1945	1,755	2,338	880	250	528	1,764
1950	1,796	2,723	915	236	538	1,624
1955	2,037	2,950	1,035	454	776	1,963
1960	1,965	2,772	1,077	417	871	1,697
1965	2,337	3,649	1,160	454	1,016	2,095
1970	2,471	3,701	1,297	520	1,096	2,154
1975	2,893	4,203	1,821	858	1,575	2,377
1980	3,417	4,567	2,064	944	1,907	2,880

SOURCE Based on data from Statistics Canada.

The faster growth on the Prairies was broadly based in the 1960-80 period (Table 13-2). The Ontario/Prairie ratio of total manufacturing output dropped from 3.5 to 2.7 over the period. By 1980, Ontario was still well ahead, but the gap was narrowing. Convergence was especially marked in electrical and mineral manufactures and in metal fabricating, machinery, and transportation equipment. Some narrowing was also evident in textiles. In food, the ratio was stable. Ironically, Ontario made significant gains only in petroleum and chemical manufacturing – a resource-based industry.

Various other sets of data could be analysed, but the general message is clear. On the Prairies, if not in British Columbia, manufacturing has persistently grown more rapidly than in the provincial economies generally, and than in central Canada. Its diversified nature suggests that this is not a phenomenon that is linked to rapid resource growth on the Prairies. Rapid resource growth has occurred in British Columbia also; yet growth in manufacturing has been slower there than in the rest of the West or in central Canada. A continuation of historical trends would imply satisfactorily rapid growth in manufacturing on the Prairies in the years to come – more rapid than in the economy generally or in central Canada. In British Columbia, we believe that slower growth will be no cause for concern if our policy recommendations for the forest industry are followed.

Further evidence is found in the expected favourable effect of *interaction* between slower resource growth and faster manufacturing growth. In a study done for the Council, Norrie and Percy argued that a marked effect of a regional resource boom is to decrease the proportion of manufacturing in the region.[1] The resource growth "crowds out" part of manufacturing, which cannot compete for labour and other inputs with the booming resource sector. The phenomenon is probably familiar to those who sought labour in Calgary in the 1970s. The converse of their findings is what matters here. When the opposite of a boom in resources occurs – namely, a slowdown – manufacturing growth can be expected to speed up. Such a speed-up was not apparent in the western data at the time of writing (early 1984) because of the depressing effect of the recession on all activity. Yet, over the longer haul, some faster growth in

Table 13-2

Output per Capita in Ontario Relative to That on the Prairies, Selected Manufacturing Industries, Canada, 1960-80

	Food and beverages	Textile products and clothing	Wood products, furniture, and paper products	Metal fabricating, machinery, and transportation equipment	Electrical and nonmetalic mineral products	Petroleum, coal, and chemical products	Total manufacturing
				(Prairies = 1.00)			
1960	1.61	3.69	3.11	5.23	4.81	2.34	3.48
1961	1.72	3.62	3.24	5.70	4.55	2.58	3.54
1962	1.68	3.30	3.33	7.44	4.55	2.79	3.81
1963	1.65	3.54	3.03	7.96	5.13	2.62	3.88
1964	1.67	3.56	3.17	8.05	5.49	2.75	3.97
1965	1.70	3.46	3.30	7.60	5.05	2.83	4.06
1966	1.66	3.24	3.09	7.57	4.81	2.75	3.96
1967	1.65	3.21	3.07	7.13	4.37	2.58	3.83
1968	1.68	3.54	2.96	7.69	4.53	2.76	3.93
1969	1.63	3.52	2.96	7.12	4.34	2.75	3.80
1970	1.55	3.10	2.92	7.64	4.58	2.84	3.71
1971	1.55	2.89	2.74	7.61	3.00	4.34	3.69
1972	1.50	2.93	2.41	7.48	3.19	4.45	3.61
1973	1.58	2.94	2.26	6.76	2.99	5.11	3.46
1974	1.45	3.00	2.57	5.69	3.11	4.97	3.28
1975	1.41	2.76	2.10	4.76	2.58	3.69	2.87
1976	1.43	3.01	2.16	4.67	2.65	3.24	2.95
1977	1.42	3.07	2.10	5.40	2.58	2.98	3.02
1978	1.53	3.11	2.08	5.55	2.60	3.09	3.11
1979	1.48	2.89	2.14	4.73	2.49	3.08	2.87
1980	1.62	3.07	2.36	3.73	2.14	3.19	2.66

SOURCE Based on data from Statistics Canada.

manufacturing should be an automatic consequence of slower growth in resources.

The observed long-run growth in the importance of manufacturing in the West may have occurred partly because of growing agglomeration economies. From mixed evidence in the western provinces, agglomeration economies seem to have helped manufacturing growth in the past, wherever population and urban density grew. They can likely be expected to continue to contribute to growth in Alberta, British Columbia, and Saskatchewan. The population should continue to grow in Alberta and British Columbia. To some extent, then, success will help to breed success. In Saskatchewan, significant urbanization will probably continue to support growth in manufacturing. Manitoba will not be helped by the agglomeration factor unless policy changes increase urbanization.

Finally, some recent evidence suggests that success in manufacturing can sometimes occur despite distance and small market size. Our research on manufacturing in Manitoba (see below) suggests that some of the manufacturing in Manitoba, in the two industries studied, is there despite the apparent locational disadvantages of distance and small local market size. Some of us strongly believe that this reflects the deeper reality that successful manufacturing enterprises can be created by determined effort. We think the local business community needs to make the effort, in collaboration with provincial and municipal governments, to develop manufacturing industries. We do not have subsidies in mind; rather, we are convinced that a canvass of local capabilities and potentialities would lead to successful initiatives in manufacturing.

In fact, a difficult question is whether manufacturing growth can be relied upon to give significant impetus to the western economies without subsidies or whether some subsidy assistance is warranted. In considering this, we note, first, our evidence to the negative cited in Chapter 6, and second, that Norrie and Percy found that attempts to stimulate manufacturing while resources remain strong can be very expensive, and probably to no avail. Is it different when resources are not so strong? In particular, would it now be worth using money from the Heritage Funds in Alberta and Saskatchewan, and general tax money in British Columbia and Manitoba, to stimulate manufacturing? In the traditional economist's jargon, do infant manufacturing industries exist in the West?

Our view is that infant manufacturing industries may indeed exist but that it is very difficult for government officials to find them. Some recent research work by the Institute for Research on Public Policy indicates that although governments may have occasionally succeeded in picking winners, they have occasionally succeeded in picking losers also.[2] In view of this evidence and our own, we do not recommend, therefore, that subsidies be given to individual manufacturing establishments or firms. But business/government consultation that involves only a slight element of subsidization to manufacturing *collectively* might uncover areas in which expansion of manufacturing activity is possible.

A special question that very often comes up in the West is whether further processing should be prescribed. Some believe that enforced upgrading before exporting would increase diversification. In the case of nonrenewables, there is also a desire to extend the life of the resources. By processing as well as extracting them, resources are thought to provide jobs for a longer time, for more people. Some upgrading is already obligatory in British Columbia, through the logging export embargo. But in the chapter on the forestry, we argued that the embargo was inefficient and recommended that it be gradually relaxed.

Many of the arguments made there apply similarly to other natural resources. If private firms are not already choosing to process resources, it seems unlikely that it would be in society's interests to force such processing or to subsidize it. Subsidies of this kind would bring diversification, but they would also reduce disposable income. Most analysts concur that this shrinking of disposable income would not be offset by the extra value added by the processing. Society as a whole would be poorer. On the question of stretching out the lifetime of nonrenewable resources, sheer physical availability is not a problem in the foreseeable future for any major resource other than conventional oil. For oil, it would be possible to increase the total number of jobs generated by the oil reserves by further processing of the oil, but we consider that the resulting cost, in terms of lower living standards, would not be worth incurring.

Thus neither "infant industry" nor "further processing" arguments justify subsidies to individual firms, whether from general tax revenue or Heritage Funds. Below, we discuss a little further some alternative uses for Heritage Funds.

Our conclusion about the possible contribution of manufacturing to longer-term growth is that, first of all, in the provinces where manufacturing has been growing significantly – Alberta and Saskatchewan – it will not only continue to do so but will probably speed up. This is due to a combination of three factors: the opposite of the "crowding-out" effect; continuing growth in agglomeration economies; and our expectation that joint action by the business community and provincial and municipal governments would

discover a few "infant industries" that could succeed without taxpayer help to individual firms.

In these two provinces, the relative size of the manufacturing sector is currently quite small. The reasons for this are the well-known ones: limited local markets; and, what amounts to the same thing, distance and transportation costs. Although markets are growing, they remain, as yet, much smaller than elsewhere. Their small initial size means that even rapid growth could not be decisive – but only helpful in maintaining satisfactory economic performance in the face of slower resource growth. Growth in efficiency and employment elsewhere, mainly in the service industries, will have to shoulder a large part of the burden.

In British Columbia, manufacturing has not been growing especially strongly, nor do we expect it to. But, in any case, if our earlier recommendations on forestry are adopted, we do not expect a slowdown in natural resource production in that province. Consequently, there is no real urgency for manufacturing to grow more rapidly there.

Manitoba is perhaps the hardest to judge. The reverse "crowding-out" effect should operate there; manufacturing growth should be a little more dynamic on account of this in the years to come; and a business/government consultation process may be able to uncover some infant industries. But agglomeration economies cannot be expected to help a great deal, since population growth and urbanization are slower in Manitoba than anywhere else in the West. On balance, we think that slightly faster manufacturing growth can be expected than has occurred recently.

Some Lessons from a Survey of Manufacturing in Manitoba

It is quite controversial to suppose that a potential for profitable manufacturing activities may exist that businessmen have not yet detected. That supposition lies behind our view that business/government exploration of the possibilities may discover unexploited manufacturing opportunities. In this section we present evidence from a special survey of the clothing and the transportation and equipment industries in Manitoba manufacturing, which we interpret as at least partial confirmation of these notions.[3]

The manufacturing sector in Manitoba has some distinctive features, compared with that in the other western provinces. The distinction is clearest in the weight of employment in Manitoba's secondary manufacturing, compared with that in the other western provinces (Table 13-3). It is also evident that Manitoba's secondary manufacturing employment tends, in effect, to "replace" the natural resource sectors and construction, all of which together are relatively more important in the other Prairie provinces and British Columbia. Finally, it is also apparent that the two surveyed components of secondary manufacturing industries – clothing, and transportation equipment – are largely responsible for Manitoba's dominant position in secondary manufacturing. Indeed, further investigation shows that these two industries together are of about the same importance *within* Manitoba as in the central provinces. Most observers are surprised, since clothing and transportation equipment industries are generally labour-intensive, and location factors would usually play a role in establishing their success. Yet Manitoba does not appear to have the usual comparative factor, or locational, advantages in these industries.

Table 13-3

Employment Weights in the Manufacturing Sector, by Subsector, Labour Force Survey, Central and Western Canada, 1975-83

	Local	Primary	Secondary
		(Per cent)	
Central Canada			
Quebec	3.8	5.5	13.2
Ontario	4.0	4.7	15.7
Western Canada			
Manitoba	3.9	2.3	7.6
Saskatchewan	2.2	1.3	2.2
Alberta	2.6	2.3	3.8
British Columbia	2.9	7.8	4.3

SOURCE H. Postner and L. Wesa, "Industrial Diversification in Western Canada: A Portfolio Analysis of the Manufacturing Sector," Economic Council of Canada (forthcoming).

Table 13-4 highlights the survey questionnaire and the particular responses that led to these observations, which may not hold for other manufacturing industries. By far the most important reasons given for starting up a firm in Manitoba involve personal *nonbusiness* factors. Generally, this response seems to mean that those starting the firms lived in Manitoba and saw no reason to pull up roots and move elsewhere before setting up business. Most firms were long-established, and those who were interviewed were from "successful" firms in terms of their survival. But even among the firms established since 1963, the pattern of responses was the same. It is, in fact, quite surprising to see the rather minor relevance of strictly economic factors such as the

availability of labour or raw materials, transportation costs, and even future growth of markets, although "access to markets" is important, and "availability of labour" of some importance, to clothing. A further interpretation of Table 13-4 leads one to recall that in Manitoba (perhaps also in Saskatchewan) much of the population dates back several generations, and there are relatively few transients. The entrepreneurs responsible for founding new firms are reluctant to locate, or even expand, elsewhere. Once started, the Manitoba manufacturing industries are relatively insensitive to purely economic incentives. Indeed, the great majority of Manitoba's firms in the two surveyed industries are of the *independent*, entrepreneurial type.

The questionnaire further reveals, however, that firms that significantly expanded manufacturing capacity during the last five years were more sensitive to traditional economic factors (Table 13-5). Here, personal *business* reasons dominate – presumably reflecting business connections.[4] Access to markets is important, as is the availability of labour. Only the few firms in the survey that were nonentrepreneurial (branch plants or subsidiaries) tended to be mainly (or even exclusively) motivated by the standard economic incentives. The entrepreneurial firms were directly, or indirectly, swayed by individual preferences and family relations.

Most sales of the surveyed firms are directed *outside* Manitoba, especially to other provinces in western Canada (Tables 13-6 and 13-7). Perhaps, then, the Manitoba location is not a disadvantage, particularly for clothing manufacturers who also sell in eastern Canada. The survey also reveals sales to the United States, especially to the Midwest. The two surveyed industries are, then, clearly not local manufacturing. An important implication is that Manitoba's manufacturing industries are surviving by depending on out-of-province markets and continued access to them.

We conclude from all of this that locational problems have probably been overestimated and the role of the entrepreneur underestimated in western manufacturing. These issues, though, are difficult to quantify. What we suspect, given the apparently almost haphazard way in which successful businesses seem to have appeared, is that a systematic search might turn up unexploited manufacturing opportunities in the West. Therefore,

46 We recommend that business and provincial and municipal governments in the Prairie provinces actively cooperate in seeking unexploited manufacturing opportunities.

We have excluded British Columbia because of our view that there is no special necessity to increase the pace of manufacturing expansion in that province.

Table 13-4

Reasons Given by Manufacturing Firms for Establishing Business in Manitoba

	Number of firms reporting				
	All firms	Clothing	Transportation equipment	Exporters	In business since 1963
Access to markets	15	2	13	9	7
Anticipated future growth of markets	4	2	2	1	1
Labour relations climate	2	1	1	1	-
Availability of labour	9	6	2	4	8
Availability of raw materials	1	1	-	-	1
Transportation facilities and costs	4	1	3	1	4
Climate	1	-	1	-	1
Access to government technical and financial support	3	-	3	2	3
Personal business factors	9	2	7	5	6
Personal nonbusiness factors	64	41	23	22	32
Other factors	4	3	1	2	3
Total number of firms	93	49	44	36	48

SOURCE N. E. Cameron, J. M. Dean, and W. S. Good, "The Manufacturing Sector in Manitoba," Economic Council of Canada, Discussion Paper 254, March 1984.

Table 13-5

Reasons Given by Manufacturing Companies for Expanding in Manitoba

	Number of firms reporting		
	All firms	Clothing	Transportation equipment
Access to markets	4	2	2
Availability of labour	4	2	2
Comparative wage rates	1	-	1
Transportation facilities and costs	1	-	1
Provincial / municipal tax structure	1	-	1
Access to government technical or financial support	1	1	-
Personal business factors	6	3	3
Personal nonbusiness factors	1	1	-
Other factors	1	-	1
Total firms responding	14	7	7

SOURCE N. E. Cameron, J. M. Dean, and W. S. Good, "The Manufacturing Sector in Manitoba," Economic Council of Canada, Discussion Paper 254, March 1984.

Table 13-6

Location of Sales by Manitoba Clothing Manufacturers

	Number of firms reporting, by region of sales				
	Manitoba	Eastern Canada	Western Canada	U.S.A.	Elsewhere in world
Percentage of all sales:					
0 - 5	15	14	10	39	48
6 - 10	10	4	2	5	2
11 - 20	3	3	11	0	0
21 - 50	10	15	18	6	1
51 - 75	1	11	7	0	0
Over 75	11	2	1	1	0

SOURCE N. E. Cameron, J. M. Dean, and W. S. Good, "The Manufacturing Sector in Manitoba," Economic Council of Canada, Discussion Paper 254, March 1984.

Would the benefits of such a search justify the costs of it to government and business? The question should be posed and it could be answered by an appropriate *ex post* cost/benefit analysis. The proper question to pose is whether the businesses that successfully started as a result of such a search could in principle collectively pay for the costs of discovering their own potentiality and still be economically successful. What the Manitoba survey suggests, as does plain common sense, is that the answer to such a question is probably yes.

The Heritage Funds and Diversification

Both Alberta and Saskatchewan have Heritage Funds, though the Alberta Fund is by far the largest. Our analysis is brief and focuses on some of the recent changes in the latter, in addition to the relationship of both Funds to manufacturing.[5]

The Alberta Heritage Savings Trust Fund was created by the Alberta provincial legislature in April

Table 13-7

Location of Sales by Manufacturers of Transportation Equipment in Manitoba

	Number of firms reporting, by region of sales				
	Manitoba	Eastern Canada	Western Canada	U.S.A.	Elsewhere in world
Percentage of all sales:					
0 - 5	1	25	15	32	41
6 - 10	3	6	3	2	1
11 - 20	3	6	1	3	-
21 - 50	15	4	15	4	1
51 - 75	5	1	6	-	-
Over 75	10	1	3	3	-

SOURCE N. E. Cameron, J. M. Dean, and W. S. Good, "The Manufacturing Sector in Manitoba," Economic Council of Canada, Discussion Paper 254, March 1984.

1976. The idea was to dedicate a percentage (30 per cent at that time) of Alberta's annual nonrenewable resource revenues to a trust fund, to be kept apart from the provincial general revenues. The Fund was to be invested in such a way as to provide Alberta with a "measure of protection" against the time when oil and gas revenues would turn down and perhaps run out. The provincial government took the view that benefits from the sale of depletable resources should belong to future generations, as well as those currently living in Alberta.

Initially, investments from the Fund were restricted to four main areas: nonprofit capital projects in Alberta; loans to other Canadian governments; those investments expected to earn a reasonable rate of return; and bonds and other fixed-income securities. Since that time there have been changes in both the composition and scope of the Fund. The annual allocation of nonrenewable resource revenues to the Fund has now been decreased to 15 per cent; in fact, some significant amounts of the Fund's net investment income have not been accumulated but, instead, have been transferred to general revenues. Still, the Fund has continued to grow over the years, though at a lower rate than that most often predicted; by June 30, 1983, total assets equaled $13.2 billion. A quick picture of the Fund's financial position can be obtained from the June 1983 (unaudited) balance sheet (Table 13-8).

Clearly, the Alberta Investment Division's investments are by far the most important; the major ones include: Alberta Agriculture Development Corporation ($715 million), Alberta Government Telephones Commission ($1,663 million), Alberta Home Mortgage Corporation ($2,518 million), Alberta Housing Corporation ($1,019 million), Alberta Municipal Financing Corporation ($1,450 million), Alberta Opportunity Company ($155 million), and participation in Syncrude ($420 million). With one exception, these investments are not in manufacturing; many are ultimately directed to Alberta's industrial or financial infrastructure. The one exception is the relatively minor Alberta Opportunity Company, which provides loans for small businesses, at least some of which could be in manufacturing. The Capital Projects Division's nonprofit investments are heavily weighted towards education; irrigation; oil sands technology; land reclamation; hospitals and medical care; and, finally, recreation and provincial parks. Thus the Capital Projects Division is largely, but not exclusively, dedicated to "quality of life."

The principal message is that the Fund has refrained from any major use of depletable resource revenue to promote, directly or indirectly, industrial "diversification" in manufacturing. In fact, the Fund is largely invested in agriculture, construction, transportation and communications, other services, and public administration. The Fund has not tried to repeat the experiences of Prairie provincial governments in their attempts to set up various manufacturing industries during the late 1940s and 1950s.[6] There is, however, some evidence that the Fund may, in the near future, be directed more towards the goal of "economic diversification via manufacturing."

Table 13-8

Assets and Liabilities, Alberta Heritage Fund, June 1983

	$ Millions
Assets	
Cash and deposits	41
Accrued interest and accounts receivable	426
Marketable securities	573
Investments by:	
Canada Investment Division	1,903
Alberta Investment Division	8,320
Energy Investment Division	25
Commercial Investment Division	199
	11,487
Deemed assets	
Investments by the Capital Projects Division	1,692
	$13,179
Liabilities and fund equity	
Accounts payable	61
Fund equity:	
Represented by net assets	$11,425
Represented by deemed assets	1,692
	$13,118
	$13,179

SOURCE Alberta Heritage Fund, *Quarterly Investment Report*, June 1983.

In 1983 the Alberta government announced the creation of a venture-capital firm, Vencap Equities Alberta Ltd., funded by an initial investment of $200 million in Fund capital. Though this amount may appear relatively small, Vencap is already the largest venture-capital company in Canada and the third largest on the continent. Though the official goal of the company is to earn "profits" (in other words, venture capital will not be distributed as a disguised form of "subsidy"), it is much too early to say how Vencap will really operate.[7] The new company is, however, directed towards relatively large enterprises (requiring at least $1 million in capitalization); so it will not duplicate the activity of the Alberta Opportunity Company in any way. But will Vencap "aid" manufacturing? We think so, because of two stipulated restrictions: all investments must be of "direct benefit" to Alberta; and Vencap cannot enter areas that are already being served by the Fund or commercial investors in, for example, oil and gas, real estate, water diversion, nuclear power, and conventional finance enterprises. This leaves open such areas as high technology, microbiology, and computer software.

The Saskatchewan Heritage Fund is much smaller and more recent than its Alberta counterpart, having been established in 1978. Its total assets in March 1983 amounted to $1,204 million. The rationale and operations of this Fund are somewhat similar to those of Alberta's Fund: it is financed by nonrenewable resource revenues (from potash, crude oil, and uranium) and, of course, cumulative investment revenue. Its assets are largely invested in the Potash Corporation of Saskatchewan, Saskatchewan Mining Development Corporation, Saskatchewan Oil and Gas Corporation, and various other provincial agricultural, power, housing, and municipal financing corporations. The emphasis, then, is on developing new sources of natural resources that cannot, or should not, be simply dismissed as "nonrenewable." This Fund does not appear to be concerned with so-called "diversification" or even with "quality of life."

Should Heritage Funds be used to subsidize manufacturing for growth purposes? They could be, with two very important limitations. First, assistance should not be extended to individual enterprises, however financed, whether from Heritage Funds or general tax revenues. Second, if Heritage Fund money is used for more generalized assistance – for example, to implement our recommendation above – that expenditure should be subjected to cost/benefit analysis and to the same administrative and political review process as expenditures from general taxation revenues. Such support might help to create some employment stability in the West.

Manufacturing and Employment Instability

The main reason that westerners want more manufacturing and diversification is to reduce long-term dependence on natural resources. Another reason, which is not as important but still significant, is to reduce the short- and medium-term instability of the economy relative to its long-term growth trend. We have shown in previous chapters that, Saskatchewan aside, such instability is not actually much more of a problem in the West than in the rest of the country these days. Nevertheless, further reductions in instability, if they could be achieved without prejudicing other important goals, such as normal growth in the manufacturing sector, would be desirable. Research conducted at the Council suggests that a reduction in instability may be possible.[8] We turn now to this question, though here we merely introduce and summarize the more detailed quantitative treatment contained in Appendix E.

A measure of provincial income instability, based on annual data, was developed in Chapter 2. Here an alternative measure, based on monthly employment data, is introduced. This measure reflects the individual contribution of each industrial sector to provincial employment instability. Provincial employment is disaggregated into various industrial sectors, one of which is manufacturing. The employment instability of each sector is measured in terms of employment fluctuations around a long-term (usually 13-year) growth trend for sectoral employment. Each sector is weighted according to its relative importance as a source of provincial employment during the relevant time period.

The overall index of provincial employment instability also depends, however, on the relationships between the various configurations of sectoral employment fluctuations. For example, if the patterns of employment fluctuations in the month-to-month changes for two distinct sectors are similar, then this particular configuration has a "superimposing" effect on the overall index of provincial instability. When the patterns of employment fluctuations are countervailing, this configuration has a net "cancellation" effect on our particular index. The consideration of both own-sector instabilities and cross-sector instabilities gives our measure of provincial economic instability a flavour of what is called "portfolio analysis."

What has all this to do with industrial diversification? Using the portfolio analogue, we can regard each sector's employment as an "investment" in economic resources. We examine sectoral employment weights (for each province) to see what changes in those weights could lessen overall provincial employment instability. In the light of the constructed instability measure, a particular sector's employment would tend to promote overall stability, not only if the sector's employment were itself stable but also if the sector's employment fluctuations (around trend) typically offset the employment fluctuations experienced by other sectors in the same province. When two "distinct" sectors exhibit significant differences in economic behaviour (measured in our case by patterns of employment fluctuations) and when these differences are offset, *then* there is economic *diversification* in the investments in the two sectors' employment. Generally, then, a province with sectoral investments in employment resources that satisfy the criterion of economic diversification will tend to experience a relatively low index of employment instability. For short, let us call this "successful diversification."

Before going on, we shall address two important potential objections. It may be argued that our implicit assumption that it is worth "promoting" industries that directly or indirectly lead to greater provincial employment stability overlooks differences in returns to labour in the various industries. There may well be a tendency for industries with stable employment to exhibit relatively low wage and salary rates. This would mean that gains in overall provincial stability could only be obtained at the cost of lower average returns to employment (using the portfolio analogue). It is easy, however, to test this hypothesis statistically and, indeed, to incorporate industry differentials in wages and salaries into our diversification exercises (see Appendix E). But there is good reason to believe that each of the western provinces can obtain greater employment stability without sacrificing average returns to employment. The key point here is the potential for various industries to promote greater stability, *both* indirectly and directly.

The other potential objection is that an increase in overall employment stability appears to put heavy demands on labour to move; that is, people must shift from where they cannot obtain work to where they can. Otherwise, how do vacancies in welding in the bus manufacturing industry help an unemployed machinery operator in the electrical machinery industry? Indeed they do not, but this kind of situation characterizes only a small fraction of the unemployment problem. Much unemployment, for example, is among new entrants to the labour force, who are often young and unskilled and have considerable flexibility about where to start work. For them, vacancies almost anywhere will do. In other cases, workers are mobile across industries, either because they are unskilled or because their skills are widely usable. In sum, we believe that the countervailing employment effects across different industries could play a very significant role in stabilizing fluctuations in both employment and unemployment.

Summarizing the results of our analysis, we found first that western Canada is not always more unstable, in terms of employment fluctuations around trend, than the provinces in central Canada. To some extent the comparisons depend on the employment coverage and the particular duration of the long-term trend period analysed. The main case in which western complaints appeared to be clearly justified was that of large firms. Data for the 1970-83 period suggest that employment in large firms in the business sector (particularly if agriculture is included) is significantly more unstable in the West, even though overall employment is not.

How does employment instability in manufacturing compare with that in other industrial sectors? The answer to this question is virtually the same for each of the four western provinces. Manufacturing is always a more stable source of employment than agriculture, forestry, mining, and construction; it even compares favourably in this respect with commercial

services. But the trade and the finance, insurance, and real estate sectors usually display more stable employment growth patterns than manufacturing. Our analysis, however, also embodies a disaggregation of the manufacturing sector; thus it is possible to identify those *particular* manufacturing industries which are good sources of stable employment growth. Those sources are not usually the same in the four western provinces, although there are some similarities.

Successful diversification, to lower provincial employment instability, requires consideration of both the direct and indirect effects of "promoting" certain industries. From our work, we found that a case could be made for promoting certain manufacturing industries in each of the four western provinces. Such promotion could not only lead to greater provincial employment stability but might also contribute to other important economic goals, such as the maintenance of a high average wage and the provision of high salary levels and long-term economic (employment) growth opportunities. Our analysis of optimal diversification, furthermore, sheds light on the benefits to be derived from various industrial strategies designed to achieve greater stability without sacrificing other goals. This type of analysis is best performed by the various provincial specialists, each with a particular and highly disaggregated industrial data base. The Economic Council of Canada will be providing a methodological "working manual" to help with such analysis.

Conclusion

We have addressed two important issues in this chapter. One is whether manufacturing growth can be expected to be sufficiently rapid to compensate for the expected slowdown in resource growth. The other is whether instability of employment in the western economies could be reduced by selective alterations to the pattern of employment within those economies.

With regard to the latter, we believe that much could be done. The analysis describes for policy makers a methodology that helps identify specific industries (some of them in manufacturing), that would directly and indirectly promote overall provincial employment stability. Subsidization could be warranted, because these industries have no market incentive to expand – their stability-promoting activities are purely external. The diversification exercises should be followed up in more detail by each of the four western provinces.

We also believe that manufacturing will contribute to maintaining growth in the West. By the same token, though, too much should not be expected because, given the very small starting base of manufacturing in the West, even fast growth would not be nearly adequate to compensate for the kind of resource slowdowns we expect. In British Columbia, this does not matter so much, because the implementation of our recommendations in other areas would largely solve the slowdown problem and obviate the need for compensation in other sectors of the economy. On the Prairies, the current weight of manufacturing means that, despite its expected fairly rapid growth, other industries, primarily in the service sector, will have to shoulder much of the job of compensating for slower growth in natural resource output. In sum, manufacturing growth in the West would be helpful but not decisive.

14 Conclusions

We are optimistic about the prospects for continued western prosperity. The West as a whole should be able very nearly to match its good past performance. We are also convinced that each of the four provinces should continue to do well. Governments at all levels can contribute substantially by fully exploiting the opportunities they have to stimulate long-term growth. Indeed, in some cases problems can only be overcome through government action.

In this chapter we outline the reasons for our optimism concerning the West and each of its constituent provinces. We then highlight some of our main recommendations for policy action. Readers are reminded that other recommendations, some highly significant for particular sectors, groups, or provinces, appear in the body of this report.

The central question that we have raised here is whether western economic success can persist indefinitely. The production of some nonrenewable natural resources is already increasing more slowly than it used to, and a slowdown may soon occur for others as well. The problem is not that nonrenewable resources are being exhausted, even at present prices, but it is one of slower growth or a leveling-off in the value of total resource output. For renewable resources also, in the forestry, fishing, and agricultural sectors, there is doubt too about whether past rates of growth in the value of output can be maintained. Again, we do not foresee a decline in the value of production – rather, a slower rate of growth therein than in the past.

By western economic success we mean something quite precise. The minimum requirement is that per capita incomes in the West remain comparable with those in the rest of the country without the need for such substantial out-migration that significant political influence in Confederation is lost. Faster growth in per capita incomes would mean greater economic success. Even the minimum requirement almost certainly implies a need for per capita real incomes in the West to grow as rapidly in the future as they have in the past. A slower rate of growth in the value of natural resource output could make this minimum difficult to achieve; some claim it would make it impossible. If they are right, a natural resource slowdown and growth in per capita real incomes at the national rate could be reconciled only by a continuous net population outflow.

In approaching the central question, we recognized the existence of two general views on the long-run evolution of resource-based economies. One is that such economies grow rapidly only for as long as the resource industries grow rapidly. They grow slowly, stop growing, or contract if the resource industries grow slowly, stop growing, or contract. With respect to this view, the only really important question is: What will happen to the growth rates of the natural resource industries in the West?

The other view is that regions or nations can sometimes grow out of their total dependence on natural resources, evolving to a structure in which natural resource output growth is valuable but no longer central to the maintenance of economic prosperity. With this view, the above question about resource growth remains important but must be supplemented by an equally important one; namely: Can two other sectors of the economy – manufacturing and services – be expected to take over gradually the prosperity-generating role of natural resources, as the latter diminish in relative importance?

It does seem that the rate of growth in the value of output of the major natural resources in the West will be somewhat slower over the next decade or so than over the last. Without offsetting policy action, that is what we predict for the forestry, coal, oil and gas, the major grains and meat, and potash industries. For natural resources of somewhat lesser individual significance such as fish, uranium, water, copper, sulphur and minor grains, the same appears to be true, though we were able to verify this directly in only a few cases. Moreover, while the modest progress of manufacturing in the past is expected to continue, no major breakthroughs seem likely. The sector will compensate only to a minor degree for the expected resource slowdown.

On the other hand, we believe the service sector will continue to contribute to western growth and that its share in that growth will rise. This will be especially true if policy makers recognize the potentialities of the sector and take advantage of them. Our optimism on the role of services in growth stems from our detailed examination of the role of the service industries in the West. The service sector has contributed

significantly to growth in living standards and jobs over the last 20 years. Moreover, a part of that contribution seems to have come about independently of developments in the natural resource industries, however difficult and counterintuitive that notion may seem. Since the oncoming setback to growth from the slower growth anticipated in the resource sector will not be large, a significant part of the moderate correction required could, in our view, be provided by increased efficiency in the service sector, if proper policy action were taken.

Moreover, our general view that resources will grow more slowly may be too pessimistic. There is a long and dismal record of doomsaying on natural resource possibilities. We would not be surprised if we were proven wrong about resources by future events; indeed we hope that is so. And our mild pessimism about growth of resources would become optimism in some cases if governments could be persuaded to take what we think is appropriate policy action, as detailed in our recommendations.

Weighing all the evidence together we conclude that the western economies will continue to grow, but not quite as rapidly as in the last couple of decades. The resource slowdown will be partially compensated for, through policy actions on the one hand, and through growth elsewhere, notably in the service sector, on the other. It follows that the western economies at present fit a view of the evolution of resource-based economies somewhere between the two extremes described above, and may even be in transition between them.

In short, resources will continue to be extremely important to the West, though not quite as crucial as they have been. We foresee a continuation of the modest progress of the past in the manufacturing sector, but no major breakthroughs. And we believe that the service sector will make a significant contribution to sustaining economic growth in the West.

Let us now look at each province individually.

British Columbia

Like the other western provinces, British Columbia is heavily resource-dependent. In other respects, it is quite different from them. This westernmost province has had better-than-average per capita incomes for over half a century. However, they have been rising less quickly than average, converging towards the western average. Unemployment rates, one measure of the chance of finding and keeping a job, have been worse than the average in other western provinces for nearly all of the years for which data exist, with no sign of improvement. They are not, however, significantly worse than the national average. British Columbia can be argued to be the most resource-dependent of all the western provinces, in that the forestry dwarfs all other goods industries in importance in the economy. And, although it has the highest proportion of employment in manufacturing, a large part of that is related to the forestry sector. The proportion of employment in services is very high. Whether as a consequence of this or for other reasons, per capita incomes in British Columbia have been very stable, by both western and national standards.

Legitimate fear can exist about the long-run future of British Columbia. The rate of growth in the potential supply of forest products threatens to slow down markedly as production approaches the ceiling set by annual allowable cuts. In the last few years the ceiling on cuts has not appeared to be a threat because the worldwide recession has depressed prices and the demand for wood products. As the recession ends, however, and prices and demand turn up again, the limits to growth set by the annual allowable cut could become a problem. For a while, rising prices, coupled with normal productivity improvements, may mask the difficulty. The risk is that when prices stop rising but yet remain at a profitable level – a level at which, in the past, it was worthwhile to expand output – expansion may no longer occur at rates comparable to those formerly achieved. The effects would be the opposite of those experienced in a resource boom. Just as a resource boom, while it lasts, can cause per capita incomes to grow faster than before, reduce unemployment rates below normal levels, and stimulate in-migration, so too a significant slowdown in the resource sector can cause per capita incomes to grow more slowly than before, raise unemployment above normal levels, and inhibit in-migration. The problem could persist for decades.

This gloomy scenario is not inevitable. Our evidence favours the view that British Columbia is not quite as dependent on the forest industry as tradition holds and that job and productivity growth in the service sector could cushion growth problems in the forest industry. In addition, while a lot of manufacturing is forestry-linked, some is not; and it should benefit, like the service sector, from growing population and urbanization. In the forestry sector itself, productivity improvements could conceivably proceed faster than before and partially or wholly offset the threat of slower output growth rates. Though unlikely, in our view, the relative prices of forest products may rise steadily and offset the more slowly rising supply of forest products.

Most significantly, the provincial government has the power to solve the problem and may choose to do so, once it becomes convinced of its urgency. Two main actions are required. One is a switch to

economic criteria in forestry harvesting, implying larger annual allowable cuts for mature timber, as well as the more frequent replanting and harvesting of second-growth timber. The other is a higher level of investment in intensive forest management. Governments could also help by appropriate action elsewhere, notably in the service industries but also in the fishery and coal industries.

Alberta

Viewed over the span of half a century, Alberta's economic performance has been about average. The heady boom of the 1970s was exceptional, and it looks as though the economy of the province will return to its position of average in the 1980s and early 1990s. Per capita income levels since the Second World War have hovered close to the national average, except very recently, and their volatility has also been about average. The province has persistently done well in terms of providing the chance of finding and keeping a job, as measured by the unemployment rate, which has been below the national average level in all periods except the very bottom of the latest recession. As in the West as a whole, job opportunities are surprisingly varied – virtually as varied as in central Canada. Alberta's level of economic performance has attracted migrants; and this, coupled with a somewhat higher-than-average birth rate, has significantly increased Alberta's population, both absolutely and relative to the rest of Canada.

The slowdown in output growth for conventional oil and natural gas is expected to bring Alberta's economic growth rate back from the very high level of the 1970s to a level at, or perhaps a little below, that in the rest of Canada. Real income levels per capita will grow at the national rates or a little below them, while unemployment rates will be a little higher than they used to be, perhaps reaching national average levels. In-migration will reflect these changes and slow down, but it will probably remain positive for the next decade.

Alberta was the only provincial economy for which we were able to supplement our qualitative judgments of future prospects, based on assessing the outlook for the main resource and nonresource industries, with quantitative estimates based on a formal econometric model. Our conclusions draw upon both approaches. The formal modeling approach does *not* indicate a secular decline, as might have been expected with the very serious future growth slowdown in the major natural resource sector – namely, conventional oil and gas. Instead, growth in gross provincial product will continue at rates comparable to Canada's gross domestic product, while economic performance, in terms of the variables that fundamentally determine the economic welfare of individuals – namely, the levels, rate of growth, and degree of variability in real income per capita; the ability to find and keep a job; and the variety of job opportunities – will be similar to that in the rest of the country. The ability to withstand a major slowdown in the growth of such an important natural resource without significant economic hardship may be due partly to the important role played nowadays, in job and real income growth, by the nonresource industries of Alberta, notably those in the service sector. Manufacturing has also been growing faster in Alberta than in central Canada and in a surprisingly diversified way. It should continue to do so, fueled partly by growing market size and urbanization and, if our above recommendation is followed, partly by joint policy initiatives on the part of the private sector and government. Nevertheless, it is not expected to play a major stimulative role, whether aided by subsidies from the Heritage Fund or not.

Several resource industries in Alberta other than oil and gas will also help to sustain growth, though they are nevertheless also expected to grow a little more slowly than in recent years. We have in mind significant contributions from expansion in grains, meat, and coal.

The other unknown element is the vigour and success of government policies. While these do not have the potential to make a major difference in Alberta, they could help. Policies on transportation, gas pricing, and the nurturing of job growth and productivity improvements in the service industries could mean the difference between achieving economic prosperity at or slightly below national levels and achieving it at somewhat above those levels.

Saskatchewan

Saskatchewan best fits the stereotype of a western province. Instability stemming from volatility in natural resource output is a key element in the picture that Canadians have of the West. The province fits the stereotype in that real income per capita is very unstable but yet growing quite rapidly. Indeed, income instability in the province is significantly greater than anywhere in any of the other western provinces. Saskatchewan, alone among the western provinces, has continued to experience greater instability than the rest of Canada since the end of the Second World War. The economy has very little manufacturing, as would be expected of a resource-based economy, but has even less than the other western provinces. The occupational distribution is more highly resource-oriented than the Canadian

average and significantly more so than that of the other western provinces. At the same time, occupational diversity is surprisingly wide.

Over the last half century, the province has performed worse than the others in terms of real income per capita. But its faster rate of growth in real income per capita has considerably narrowed the gap between it and the other western provinces. Incomes are now just a little below the Canadian average. In recent years, incomes in Saskatchewan have overtaken those in Manitoba, but it is too soon to know if this is a permanent reversal of position. The unemployment rate has always been well below the national average.

Some would regard the Saskatchewan economy as an example of the growth and retrenchment view of economic development. Over the long haul, the rate of growth in the output value of grains – the major natural resource throughout the 60-year period for which we have income data – has not been adequate, given the falling labour requirements of production per bushel, to maintain a rate of growth in real income per capita and in population comparable to that in the rest of Canada. In absolute terms, however, a small population increase has occurred.

Since the Second World War the Saskatchewan economy has acquired a more diverse set of natural resource industries, including oil and gas, uranium, potash, and a greater variety of grains. In addition, the relative importance of the service sector has grown considerably – a significant stablilizing element – and there has been some growth in the manufacturing sector as well.

Two main problems lie ahead: instability and lack of growth. Instability in the grain industry is not likely to lessen; on the contrary, it will probably increase over the remainder of the century. Something can be done about this but not much. The long-run growth problem stems from the fact that for none of the major natural resource industries in Saskatchewan do rates of growth in output value seem likely to be faster over the next 15 years than they were over the last 15. For wheat and barley – the biggest crops – output is expected to rise rather slowly; real prices seem more likely to fall slightly than rise. Gains from the expansion of potash output seem likely to be smaller in the future than they were in the past, and an improvement in the relative price of potash seems unlikely. The prospects for coal are fair at best. The value of production of oil and gas in Saskatchewan, as in Alberta, will increase much more slowly than hitherto and eventually go into decline. The value of uranium output will also grow more slowly than it did in the past.

Such gloomy prognostications of economists have often proved false. Nevertheless, should we be correct, past experience would suggest that the effect of the projected slower growth in the output value of natural resources will be somewhat slower growth in per capita real incomes than has occurred recently, yet probably still fast enough to maintain a slow convergence towards the national average. Unemployment rates seem unlikely to be much affected. In those years when grain revenues are below trend and rising very slowly or falling, there is likely to be out-migration, to the extent that Saskatchewan's population growth (counting the good years and the bad) will remain below the national average. From the point of view of the economic well-being of individuals, this is by no means a doomsday scenario. For those favouring provincial population growth it is less appealing.

There is scope for policy improvement, so as to create, or permit, faster growth in real incomes per capita or higher growth in provincial population, or some combination of the two. The rate of growth of productivity in grains could be increased; improvements in transportation efficiency could be encouraged; export sales of gas could be enhanced; and, finally, the rate of growth of jobs and efficiency in the service sector could be raised.

Manitoba

Manitoba currently has the lowest real income per capita of all the western provinces. In the country as a whole, only the Atlantic region is worse off with respect to this economic indicator. The growth rate of per capita incomes in the last 60 years has been slightly better than in British Columbia but much worse than in Alberta or Saskatchewan. In the last 20 years Manitoba has had the lowest rate of income growth in the West; and, for the country as a whole, only that in Ontario has grown more slowly. But per capita incomes are very stable; there is a great diversity of occupational choice; and unemployment rates are very low, by national standards.

The prospects are hard to assess. The province's relatively heavy proportion of services augurs well, in that the prospects of this sector producing significant growth in jobs and living standards are good, and also amenable to significant policy improvement. Moreover, some of the service sector in Manitoba depends for its prosperity on the trading of certain "invisible" exports to other Prairie provinces – exports for which the growth rate prospects seem better than those for the value of natural resource production in general. Transport services – a Manitoba "invisible" export – will grow with the volume of resources shipped rather than with the

value shipped, and the volume growth rate for resources is likely to fall less than the value growth rate. Financial and insurance service exports will depend heavily on population and income growth in the rest of Canada and in the United States. This will have very little connection to any decline in the growth rate of the value of resource production.

At the same time, certain other invisible exports from Manitoba, and probably most of the manufactured exports, will have growth rates that reflect the slowed-down growth rates of the other Prairie provinces and will thus have a dampening effect on Manitoba's overall growth rate compared with recent years. Finally, Manitoba's most significant natural resource export – grains – will be subject to the same forces that are predicted to cause slower growth in Saskatchewan and Alberta.

Weighing all of these factors by judgment is very difficult. Our assessment would be that of slightly slower growth in real incomes per capita than in the past, but not as much of a slowdown for this variable as in the other western provinces. This could improve Manitoba's relative position if the other provinces did not succeed in implementing growth-improving policies. If they did, Manitoba's position relative to them might not improve, but the spin-offs would make Manitobans better off in an absolute sense.

There is scope for policy to improve this outlook in three areas: grains, manufacturing, and the service sector, including transportation. Suffice it to say here that policies in these areas, together with a number of minor but worthwhile improvements in other areas such as potash, oil and gas, forestry, and the export of hydro-electricity, could make a significant difference in the rate of growth of real incomes per capita in Manitoba over the next 15 years.

Government Responsibilities

Governments could increase western prosperity considerably if they chose to. Moreover, the actions that we are suggesting would benefit the West without damaging the rest of the country. If anything, there would be favourable repercussions in other parts of Canada.

The provincial governments have the greatest opportunities. The federal government and the municipalities can play less critical, but useful, roles. We have noted numerous areas where detailed action would enable the western provincial economies to provide higher living standards and more jobs for their population. In this concluding section, we recall only those recommendations which are most important for the resource industries, manufacturing, and the service sector.

For the forest industry, our key recommendations turn on an attitudinal transformation in the administration of the industry. All the western provincial governments are involved, as well as the federal government, but the problem is obviously most serious in British Columbia. Thus action by the B.C. provincial government would be most significant. First of all, replanting needs to occur more frequently, and concomitantly so does harvesting; in other words, rotation periods should be shortened. The degree of shortening will vary by species and with other factors, but rotation periods should be chosen not only to ensure a permanently sustainable yield from the forest, as is done now, but also to make the value of that yield to the people as high as possible (which is not done now). Hence, we recommended that "there be much greater emphasis on economic criteria and far less on physical criteria when choosing rotation periods for second-growth timber, provided that this can be done with full provision for the protection of the environment."

Second, where timber exists that is already mature and profitably marketable, it should be marketed as soon as possible, and the opportunity should be taken to replant the land thus freed, provided of course that this makes economic and environmental sense, as it usually will. The evidence shows that a huge quantity of such timber exists. It is not just that the opportunity to realize its value and to replant for the future is being forgone; it is also that quite often the mature standing timber is subject to erosion in value from pests and risk of fire. The annual allowable cuts from mature standing timber should therefore be considerably increased and the vacated stands normally replanted. This should be done even if it implies a temporary future dip in annual yields below the eventual permanently sustainable yield, because only in this way can the value of the forest to the citizens be maximized. It is this value that counts. To achieve all of this, we recommended that "the stock of mature timber in British Columbia be harvested at a faster rate than present policies permit, as soon as (and whenever) market conditions make it profitable to do so, and that this be done with full provision for environmental protection." Third, the level of investment in intensive forest management needs to be increased considerably and better directed towards those areas and timber types where it would be most productive. Specifically, we recommended that "all intensive forest management practices for which the present value is positive be undertaken and that those investments with the highest ratio of benefits to costs be undertaken first." This recommendation will require some changes in the institutional arrangements for bringing about such investment. These

changes were explained in detail in the chapter on forestry, and objections to them were considered.

Several other important recommendations affecting forestry were made as well, with respect to rail transportation, ocean shipping, and stumpage. Their implementation would help in all provinces, but in British Columbia they are crucial for obtaining the maximum possible rate of growth in real incomes per capita and for avoiding the threat of a serious slowdown in that growth.

The value of appropriate action in other natural resource areas is probably lower than in forestry; nevertheless, it is high. In potash, Canada, in general, and Saskatchewan, in particular, have considerable market power in North America. Exercising this market power to the full would benefit the citizens of Saskatchewan, but it would be costly for the nation as a whole, in political and international terms. We discussed these issues in considerable detail and ended up making no recommendation, which implicitly suggests that market power should not be exerted in this case. Thus there is little scope for government action to improve growth in potash revenues. The most that can be done is to avoid going to the other extreme and producing so much potash that the price will drop to the point where the full, long-run production costs will be unrecoverable.

Among the other resources, four seem especially promising: grains, red meat, the fishery, and oil and gas.

In grains, several changes, each relatively small, could together raise productivity significantly and Prairie incomes along with it. For example, we recommended that "selective deregulation and regulatory amendments be explored for the specific purpose of improving productivity in the agricultural sector." Examples of what we had in mind were given, including certain aspects of the grain quota system, the wheat grading system, and the allocation of railway cars.

We considered it important also that there be a better resolution of the Crow Rate problem than at present. Paying the benefits to the farmers instead of the railways, despite the numerous complexities and political difficulties involved because of the redistribution of income that is implied within the Prairies, would be economically the most efficient solution. As such, it would be a net gain for the West as a whole. The loss to Quebec would, we believe, be slight compared with the western gain and could be compensated for in a better, less socially expensive manner. Thus we recommended that "If the Committee to consider how the Crow Benefit is paid thinks it appropriate to re-examine the method of the Crow Benefit payment from first principles, serious consideration be given to the possibility of making the payment directly to the farmers concerned and also of making the freight rate, as prescribed by Bill C-155, payable entirely by the shippers, with due allowance for the "safety-net" provision. In the spirit of Section 59 of the 1982 Act to facilitate the transportation, shipping, and handling of western grain and to amend certain Acts in consequence thereof, the intent of which is to extend the Crow Benefit to the grain growers of the Peace River region, we urge that this recommendation apply to them as well."

A quite different issue in the grains industry is the threat of growing instability. That threat cannot be countered very effectively, but its potential effects could be moderated somewhat by an attempt to resuscitate international agreements aimed at smoothing out the year-to-year fluctuations in grain prices around trend, and other measures to help farmers cope with such instability as remains.

For the red meat industry, we found that there was scope for action on the marketing side. Good potential exists in both California and Japan, and so we recommended that "product-specific market research be conducted on the California market for western meat products. The focus should be on evaluating particular markets from both an economic and a political perspective." We also recommended that "considerably more effort be made by the federal government, western provincial governments, product marketing agencies, and, if possible, private industry to establish contacts and become familiar with the Japanese meat products market."

The fishery industry is sizeable only in British Columbia and rather small even there. A recent Royal Commission Report analysed the situation exhaustively. We think that it gave an excellent survey of the issues and urge that the federal government consider its recommendations very seriously. We would especially stress the importance of implementing what we see as the central proposal of the report: to move, wherever possible, to control the catch by allocating rights to a fixed annual catch of fish, instead of trying to control the catch volume by regulating the quantity of inputs used. We accept the Commission's reservations about the difficulties in using this technique for roe-herring and salmon, and we consider the proposals for improved input controls made for these two fish a good second-best solution. We therefore recommended "speedy adoption of the principal ideas of the Royal Commission on Pacific Fisheries Policy on how to limit the catch in the B.C. fishery – namely, through the use of quotas in most cases, except for salmon and roe-herring, to which revised controls on fishing inputs would apply." An important point is that the very

substantial gains from fishery rationalization would accrue almost exclusively to the federal government. Since B.C. residents would be affected by such rationalization, we concluded that such a change might be made more easily if they could share in the gains.

In oil and gas, we have made only one recommendation in this report – namely, that "the Canadian government and the natural gas industry continue to seek more flexible means of realizing the economic potential from Canadian exports of natural gas," including "more reliance than at present on negotiated prices; however, as long as the federal and state governments in the United States are involved in the gas industry, there will continue to be a need for involvement by the federal government in Canada." We will be making more recommendations for this industry when we publish our energy report in a few months. The Alberta economy would, of course, be the main beneficiary of a change towards greater flexibility in gas pricing.

In manufacturing, we found that this industry, though contracting relatively in other parts of the country, is still growing in the West. It is still much smaller in the West than elsewhere. Nevertheless, we believe that it could make a useful contribution to economic growth. And we made the specific recommendation that "business and provincial and municipal governments in the Prairie provinces actively cooperate in seeking unexploited manufacturing opportunities." It is also possible, on the basis of our analysis in the chapter on manufacturing, that selective promotion of particular kinds of manufacturing would stabilize employment in the western provinces.

The industries in the service sector dominate every one of the provincial economies nowadays; therefore, any improvements would be very significant in improving living standards and employment growth. The main point that we stressed for the service sector can be summed up in two words: pay attention. An array of government programs exists in the goods industries to complement the functioning of the market, but not in the service industries. Two wide-ranging general areas of government involvement in the goods industries are: the promotion of technical change through assistance to research and development and to the diffusion of technology whether home-grown or acquired from abroad; and assistance to small business for capital and necessary management skills. Our key recommendation is that these two kinds of help be extended to the service sector industries as well, whether market or nonmarket. Thus we recommended that "the federal, provincial, and municipal administrations in Canada take a hard look at all of their current industry and business policies with a view to identifying unexploited opportunities, especially in the area of aid to small business and the promotion of technological change, in order to create greater efficiency in the service sector." For the market sector of the service industries, this will most often be a federal responsibility, though the municipalities may also play a role in matters such as zoning. For the nonmarket service sector industries it will be largely a provincial responsibility.

Despite the importance of productivity improvement in the service sector for living standards and job opportunities, we cannot always know, in the present state of measurement techniques and data availability, whether the needed productivity improvements are occurring. This is an incredible state of affairs, and we would like to reiterate here how important better data are.

What we have said so far on the service sector could, or should, apply everywhere, not just to the West. Improvement in those service industries which influence the costs and profits of the natural resource industries, however, is especially important for the West. Decreasing the spread between the cost at the farm or mine gate and the cost to the ultimate purchaser has the same beneficial effects as a rise in market prices for the West's resources. With this in mind, we recommended that "the federal and provincial governments more actively promote technological change in those parts of the service sector in the West which affect the wedge between the prices received for exports at the point of sale and the prices received at the point of production." Another important result was that generally the growing importance of the service industries implies a much more significant role than in the past for policy making by municipalities.

Other recommendations on the service sector stemmed from our research showing that agglomeration economies are important for increasing productivity in the sector. A package of recommendations was developed to take advantage of this phenomenon. We consider two of these particularly important; and if you recall, we recommended that "in determining their regional development policies, the western provinces take due note of not only the social value of small towns and rural life but also the economic benefits to be obtained from encouraging growth and diversification in larger cities." We also recommended that "general economic development funds be used in the West in part to subsidize the development of new cultural, social, and recreational facilities and the improvement of existing ones."

We close by reiterating our major conclusion: we are optimistic about western growth. More than that, our evidence suggests the possibility – perhaps even

the probability – that economic development in the West is in transition.

Shakespeare, as usual, had the appropriate phrase. The western economy may be undergoing, in his words, a "sea change, into something rich and 'strange.'" While remaining recognizably resource-specialized, the success of the West may come to depend as much on high performance in the service and manufacturing industries as in the resource industries. If this comes to pass, the West will be intrinsically more stable in the future, offering more reliable long-term growth than it ever has in the past.

Dissent

Douglas P. Thomas

I find myself in disagreement with the basic thrust of Chapter 5, "The Forest Industry" and with several of the recommendations.

On page 48 the study states that,

> "Two distinct issues are at stake when discussing the regulatory role of government in the forestry industry. First, how should the existing inventory of mature timber be managed? Second, once the land is replanted, at what age should the second-growth timber be cut? The answers to these questions will play a critical role in determining timber supplies, in British Columbia and elsewhere. Present forest management policies lead to too slow a depletion of mature timber stocks and too long a rotation period for second-growth stands. The net effect is that supplies over the next 20 years or so will be sharply and unwisely restricted, while supplies beyond that period will be unwisely expanded."

On the first point, it is the general thesis of the study that the existing inventory of mature timber should be more rapidly cut, and I do not agree with this.

First, I am not sure, and the study does not indicate, how fast the mature timber would be cut or when it would effectively be all gone. However, it would be cut a good deal faster than it would be replaced; that is to say, if all the trees 100 years of age or more were effectively cut down within a 50-year period (and it might be sooner), then at that point the oldest replacement tree would be the same age – that is, 50 years. The average age of the replacement forest would be somewhere in between, maybe 25 or 30 years, and the mature trees would be completely eliminated.

I am not sure if the idea is then to harvest these younger trees as second growth or whether the idea is to let them grow to 100 or more, but in either case, the province at that time has a substantially less valuable resource. One would be taking that resource from future generations, and I am not in favour of that.

Second, the idea that the cash generated from the more rapid cutting of the mature trees will be more effectively used by the present generation than by the future is a little difficult to accept. The study notes,

> "The mature timber represents locked-up capital that is currently yielding nothing and very often actually depreciating. The income forgone from not cutting this timber is very substantial indeed."

and the point is even more plainly made by the quotation from Hartley Lewis on page 51.

It strikes me as naive to assume that governments will act so altruistically as to hoard the cash generated from a higher cutting rate carefully and invest it wisely. In my view, the money will be gulped down in present consumption, either to help with the current deficit or to meet expanding services; and let no one think that services will not rise to meet the funds available to them. The present situation of the Alberta Heritage Fund is a good example of what happens: funds are great when things are good; but when things are tough, they are there to be used.

Third, what guarantee does society have that proper reforestation will take place? Certainly, history does not lend confidence to the possibility of a widespread ongoing program taking place over the period when the mature forest is being eliminated. Present intentions can be tripped up by all sorts of things – many, such as general economic conditions, out of the control of governments. Who knows if future costs of replanting at the required rate will become prohibitive and the rate consequently lowered? There are just too many variables in this side of the equation for me to understand it as an offset to more rapid cutting of the mature forest.

Fourth, and this I believe to be very important, the study does not adequately deal with the higher environmental costs of more rapid cutting. Soil erosion caused by cutting and the building of logging roads, pollution and the water quality in the lakes and rivers, changes in drainage patterns and even small-scale local climate changes all produce costs that should be part of the calculation. It could well be that the additional cash generated by the more rapid cutting will be used up in repairing the additional environmental damage. I realize calculations of this type are difficult; but I do not believe that today we can support a move that impacts the environment without knowing the costs, because both governments and industry are seeing these costs move steadily up.

Fifth, on the second major issue, the age at which second-growth timber should be cut, and the use of

economic rather than physical criteria to determine the rotation period, I also have some doubts. Frankly, to arrive at values such as the "present net worth of stumpage" or the "soil expectation value" by estimating timber prices, discount rates, harvesting costs, replanting costs, and so on is a speculative enterprise in which I have no confidence. In the last 10 years, we have seen such volatility in factors of this nature that about all one knows is that the calculation is going to be wrong. Unfortunately, because it comes down to a hard number, it is often popularly thought to be correct, and this sort of calculation can therefore be very misleading.

I guess I would like to know more about the costs – environmental and other – of a more rapid rotation period. Here again, the whole thesis hangs on the hope that the replanting will be done, and I would be interested in some historical evidence of the record in this respect.

With this background, it is apparent that I am in disagreement with recommendations 1, 2, and 7 and that recommendations 4 and 11 are a bit in the area of wishful thinking. I am not solaced in my opposition to these recommendations by such phrases as "that this be done with full provision for environmental protection," because it does not answer the questions of environmental costs, and I do not know of any instance when such giveaway phrases have in fact done the deed for which they were intended.

Finally, although my disagreement is rooted in economic considerations, I must say that too little consideration is given in studies of this kind to the environmental impact of recommendations. Passing reference is made in the text to forest managers who might view trees as an end in themselves, with the inference that that would be somewhat eccentric. British Columbia has a magnificent heritage in its mature timber stands, with a rich abundance of wild life, rare species, and clean water; and I am not convinced that it should be exploited in the theoretical hope that a larger present income will be more profitably used now than in the future.

Recommendations

1 We recommend that the stock of mature timber in British Columbia be harvested at a faster rate than present policies permit, as soon as (and whenever) market conditions make it profitable to do so, and that this be done with full provision for environmental protection.

2 We recommend that there be much greater emphasis on economic criteria and far less on physical criteria when choosing rotation periods for second-growth timber, provided that this can be done with full provision for the protection of the environment.

3 We recommend that all intensive forest management practices for which the present value is positive be undertaken and that those investments with the highest ratio of benefits to costs be undertaken first.

4 We recommend that the government of British Columbia, through a savings fund similar to the Heritage Funds of Alberta and Saskatchewan, earmark monies for investment in forestry.

5 We recommend that the Crown bear all costs related to basic and intensive forest management on Crown lands.

6 We recommend that the actual mechanics of undertaking investments in basic and intensive forest management involve a mix of public and private sector participation.

7 We recommend that provincial governments consider the economic impact of restrictions on logging and of further reductions in the forest base, particularly when they affect good and medium-quality timber sites. The costs of environmental restrictions and of the additional removal of productive land from the forest base should be compared with the stream of anticipated benefits.

8 We recommend that when the Rothery system is employed to calculate the values of stumpage, the profit allowances be linked explicitly to the before-tax opportunity cost of the capital stock that would be used by the average efficient forestry operator.

9 We recommend that stumpage payments be a lump sum based on the appraisal value of the timber on site.

10 We recommend that provincial restrictions on the export of unprocessed logs be gradually relaxed.

11 We recommend that the federal government ensure that the western forestry industry will continue to have access to the lowest-cost ocean transportation available; that rail freight rates will not discriminate against forest products; and that bottlenecks in the rail system will not hamper the industry's access to Canadian or U.S. markets.

12 We recommend that the Canadian government and the natural gas industry continue to seek more flexible means of realizing the economic potential from Canadian exports of natural gas. We also recommend more reliance than at present on negotiated prices; however, as long as the federal and state governments in the United States are involved in the gas industry, there will continue to be a need for involvement by the federal government in Canada.

13 We recommend that Canada strengthen its efforts to seek an International Wheat Agreement.

14 We recommend that Canada seek to diversify its grain markets by bilateral bargaining and countertrade.

15 We recommend that Canada strengthen the Western Grain Stabilization Program.

16 We recommend that Canada augment its support to research in agriculture and improve the environment for the adoption and adaptation of both domestic and international technological advances.

17 We recommend that selective deregulation and regulatory amendments be explored for the specific purpose of improving productivity in the agricultural sector.

18 We recommend that product-specific market research be conducted on the California market for western meat products. The focus should be on evaluating particular markets from both an economic and a political perspective.

19 We recommend that considerably more effort be made by the federal government, western provincial governments, product marketing agencies, and, if possible, private industry to establish contacts and become familiar with the Japanese meat products market. A special effort should be made to ensure that Canadian processors are informed and educated about Japanese methods and requirements. The objective is to have the industry ready to take advantage of any relaxation in Japanese import policies.

20 We recommend that preferably the livestock and meat-processing industry (but if necessary the federal government) conduct research into the question, "Is the structure of the western livestock and meat industry suitable for trade in current and expected international markets?" If problems are identified, alternative structures should be proposed and, if possible, promoted.

21 We recommend that industry in all provinces bear a substantial part of the costs of the provision of dedicated investments related to new developments,

in order that a significant part of the risk of demand uncertainty falls on the private sector.

22 We recommend that royalty systems be designed so as to be as neutral as possible. A profits tax should be employed wherever feasible.

23 We recommend that the provinces refrain from subsidizing consumers of electricity by pricing domestic thermal coal at cost.

24 We recommend that the benefits to Saskatchewan of exporting unprocessed uranium be recognized by the federal government, especially when these exports do not replace refined uranium exports from Ontario or other provinces.

25 We recommend the speedy adoption of the principal ideas of the Royal Commission on Pacific Fisheries Policy on how to limit the catch in the B.C. fishery – namely, through the use of quotas in most cases, except for salmon and roe-herring, to which revised controls on fishing inputs would apply.

26 We recommend that ways be sought whereby part of the federal revenues to be obtained from rationalizing the B.C. fishery could be used to provide incentive for change to those most directly concerned.

27 We recommend that the western provinces institute water charges and water-charging systems that are more in line with the scarcity value of water.

28 We recommend that the western provinces reform the laws governing water rights so as to facilitate the sale of such rights between users of water, subject to the veto of a provincial water management authority.

29 We recommend continued government vigilance to protect the quality of the water bodies, and in particular the imposition of effluent charges in line with the scarcity value of water.

30 We recommend that if the Committee to consider how the Crow Benefit is paid thinks it appropriate to re-examine the method of the Crow Benefit payment from first principles, serious consideration be given to the possibility of making the payment directly to the farmers concerned and also of making the freight rate, as prescribed by Bill C-155, payable entirely by the shippers, with due allowance for the "safety-net" provision. In the spirit of Section 59 of the 1983 Act to facilitate the transportation, shipping, and handling of western grain and to amend certain Acts in consequence thereof, the intent of which is to extend the Crow Benefit to the grain growers of the Peace River region, we urge that this recommendation apply to them as well.

31 We recommend that the Feed Freight Assistance Program be phased out over a five-year period.

32 We recommend that within five years the "At and East" shipping rates for western grain and flour be gradually raised to the level of the compensatory rate and that the subsidy covering the difference between the two types of rates be phased out.

33 We recommend that the present latitude in setting freight rates, as prescribed in the National Transport Act, be retained. If diversification or stimulation of western manufacturing is regarded as in the national interest, it should not be achieved by tinkering with transportation freight rates.

34 We recommend that the roadbed of the railways not be nationalized.

35 We reiterate our recommendation in *Reforming Regulation* that all regulatory restrictions on the operating freedom of existing for-hire motor carriers be removed, that the process of applying for trucking licences be simplified, that price regulation be abolished, and that the permission for own-account trucking be expanded to cover the transportation of the goods of corporate affiliates, in addition to those of the parent corporation.

36 We recommend that the federal, provincial, and municipal administrations in Canada take a hard look at all of their current industry and business policies with a view to identifying unexploited opportunities, especially in the area of aid to small business and the promotion of technological change, in order to create greater efficiency in the service sector.

37 We recommend that the federal and provincial governments more actively promote technological change in those parts of the service sector in the West which affect the wedge between the prices received for exports at the point of sale and the prices received at the point of production.

38 We recommend that the municipal level of government become actively involved in the identification of development opportunities in the service sector and that it design local strategies to facilitate the establishment and growth of service-sector firms.

39 We recommend that provincial governments adopt as a major element of their manpower and small business development policies the provision of locally accessible training centres for microprocessor and information-based technologies.

40 We recommend that, in determining their regional development policies, the western provinces take due note of not only the social value of small towns and rural life but also the economic benefits to be obtained from encouraging growth and diversification in larger cities.

41 We recommend that general economic development funds be used in the West in part to subsidize the development of new cultural, social, and recreational facilities and the improvement of existing ones.

42 We recommend that an Interurban Technology Information Group be set up. Its mandate would be to collect, and disseminate to its members, information on innovative practices in use in municipal management and in the provision of urban public services in Canada and abroad. The Group would be supported by contributions from municipal members. The cost to members would be small, on an

individual basis, relative to the benefits that would be derived from information on innovation in municipal affairs.

43 We recommend that municipal economic development departments adopt as one of their primary development tools the fostering of close, direct links between the local business community, labour groups, local universities, and research institutions.

44 We recommend that urban governments in the western provinces examine current zoning practices with a view to ensuring that such practices do not inhibit the establishment and growth of important service industries, such as specialized business services, financial intermediaries, information-based services, and specialized medical and educational facilities.

45 We recommend that Statistics Canada undertake to conduct surveys of business activity in the service sector with a view to collecting data on business location, size, income, and costs. At the minimum, such surveys should be conducted every five years.

46 We recommend that business and provincial and municipal governments in the Prairie provinces actively cooperate in seeking unexploited manufacturing opportunities.

Appendix A

Appendix to Chapter 2

Bernard Blishen of York University in Toronto and Hugh McRoberts of Carleton University in Ottawa have constructed a socioeconomic class scale for almost 500 occupations. It was based primarily on a survey, in which about a thousand people gave their views on the social standing of 88 occupations. For these occupations the prestige ranking was usually closely related to two factors: income; and the educational qualifications of the people in the occupation. In general, the higher the income and the higher the educational attainment, the more prestigious the occupation was considered to be. An occupation could, for example, have high prestige if it required a sufficiently high education, even if income was not very high; the converse was also true, though usually education and income went together. Accepting this prestige link to income and education as being also applicable to occupations other than the 88 directly ranked by the thousand people, the two sociologists were then able to arrive at a ranking for a total of almost 500 occupations defined in the census. This ranking was used to classify jobs into 10 broad categories, beginning with the highest-ranking category and scaling down to the lowest rank, and to show the distribution of employment among them in the West and in central Canada. Table A-1 shows the complete ranking of all occupations, arranged alphabetically, to allow readers to judge its validity for themselves.

Table A-1

Alphabetical Listing of Occupations, by Socioeconomic Index and Rank, Canada, 1971

Classification number	Occupations	Socio-economic index	Rank
8373	Abraders and polishers: clay, glass, and stone, n.e.c.	30.3649	388
1171	Accountants, auditors, and financial officers	67.4100	37
3335	Actors	49.4299	176
3314	Advertising and illustrating artists	48.6593	185
4192	Adjusters, claim	53.1130	140
1134	Administrators, medicine and health	70.4313	20
1133	Administrators, teaching and related fields	75.2846	1
5174	Advertising salesmen	57.2838	105
2155	Aeronautical engineers	66.9202	42
2131	Agriculturalists and related scientists	61.1907	78
9119	Air transport operating occupations, n.e.c.	41.2020	260
9113	Air transport operating, support	59.1959	91
8515	Aircraft assemblers, n.e.c.	41.7126	253
8582	Aircraft mechanics and repairmen	51.5605	153
6169	Apparel and furnishings, service, n.e.c.	26.7076	443
2165	Architectural and engineering technologists and technicians	62.5002	66
2141	Architects	71.9520	13
2159	Architects and engineers, n.e.c.	68.9527	26
8579	Assembling and repairing occupations: rubber and related products, n.e.c.	31.3242	380
8569	Assembling and repairing textile, fur, and leather products, n.e.c.	23.2252	477
8539	Assembling, installing, and repairing electrical and electronic equipment, n.e.c.	34.8363	334
3373	Athletes	49.2975	177
3375	Attendants, sports and recreation	29.9834	394
6147	Babysitters	24.5828	466
8213	Bakers, confectionery makers, and related	28.4424	420
6143	Barbers, hairdressers, and related	25.0670	460
6123	Bartenders	26.4920	449
8227	Beverage processors	40.7490	268
2133	Biologists and related scientists	65.7778	50
7715	Blasters	33.3923	349
8337	Boilermakers, platers, and structural metal workers	41.0745	264
8571	Bonders and cementers: rubber, plastic and related products	33.7494	347
9517	Bookbinders and related	38.8055	291
4131	Bookkeepers and accounting clerks	50.7098	160
4139	Bookkeeping, account-recording, and related occupations, n.e.c.	50.9450	159
8782	Brick and stone masons, and tile setters	29.4705	405
9171	Bus drivers	32.2318	368
8585	Business machine mechanics and repairmen	50.1433	166
8525	Business machine assemblers, n.e.c.	50.2132	165
5177	Business services salesmen	60.8690	81
5191	Buyers, wholesale and retail trade	55.4303	124
8541	Cabinet and wood furniture makers	27.0457	436
7311	Captains and officers, fishing vessels	29.7920	398
8781	Carpenters and related occupations	28.0382	422
8251	Cellulose pulp preparers	44.2194	233
6133	Chambermaids and housemen	27.1178	435
6121	Chefs and cooks	26.8068	441
8179	Chemicals, petroleum, rubber, plastic and related materials processors, n.e.c.	45.6396	214
2142	Chemical engineers	70.8910	18
2111	Chemists	66.4193	45
2143	Civil engineers	69.2593	23
8379	Clay, glass, and stone machining, n.e.c.	32.1559	370
8159	Clay, glass, and stone processing, n.e.c.	32.1517	371
3370	Coaches, trainers, instructors, and managers: sports and recreation	46.8675	203
8173	Coaters and calenderers, chemical and related materials	33.0795	353
4191	Collectors	49.7978	171
5133	Commercial travellers	57.4109	104
6116	Commissioned officers, armed forces	68.1072	34
8783	Concrete finishers and related	29.0537	408
9133	Conductors and brakemen, railway	47.8677	194
8733	Construction electricians and repairmen	46.8823	202

Table A-1 (cont'd.)

Classification number	Occupations	Socio-economic index	Rank
8171	Crushers and grinders, chemicals and related materials	31.4274	378
8111	Crushers and grinders, mineral ores	37.9576	305
8575	Cutters and finishers: rubber, plastic, and related products	31.8769	374
8371	Cutters and shapers: clay, glass and stone	28.6463	418
3333	Dancers and choreographers	38.2202	302
9155	Deck crew, ship	28.9568	411
9151	Deck officers	44.8931	222
3157	Dental hygienists, assistants, and technicians	48.2832	189
3113	Dentists	74.6984	3
3152	Dieticians and nutritionists	64.4183	59
3154	Dispensing opticians	49.7960	172
8165	Distillers, sublimers, and carbonizers: chemicals and related materials	57.4990	103
2163	Draughtsmen	62.0921	69
5193	Driver-salesmen	32.8339	357
2311	Economists	69.6355	22
2391	Educational and vocational counsellors	71.9267	14
8533	Electrical and related equipment installers and repairers, n.e.c.	43.7960	238
2144	Electrical engineers	70.7401	19
8531	Electrical equipment assemblers	35.4749	326
8731	Electrical power linemen and related	48.5124	186
8535	Electronic and related equipment installers and repairers, n.e.c.	59.7432	87
9559	Electronic communications equipment operating occupations, n.e.c.	54.0143	135
4143	Electronic data processing equipment operators	55.8252	119
8534	Electronic equipment assemblers	38.5749	294
2731	Elementary and kindergarten teachers	65.8531	49
6193	Elevator operators	23.0774	479
9157	Engine and boiler-room crew, ship	29.8589	396
8511	Engine assemblers, n.e.c.	34.5173	339
9153	Engineering officers, ship	41.8162	251
8391	Engravers, etchers and related workers	38.7543	292
8711	Excavators, graders, and related	29.8278	397
8719	Excavating, grading, and paving, n.e.c.	32.7188	359
8718	Excavating, grading, and paving labourers	23.9854	474
8549	Fabricating, assembling, and repairing occupations: wood products, n.e.c.	24.8377	463
7197	Farm machinery operators and custom operators	26.2011	451
7131	Farm managers	27.9879	425
7182	Farm workers	24.2541	472
7112	Farmers	23.0227	480
8393	Filers, grinders, buffers, cleaners, and polishers, n.e.c.	32.9927	355
8163	Filterers, strainers, and separators: chemicals and related materials	42.3316	248
1135	Financial management occupations	68.2250	33
2792	Fine arts school teachers	55.4545	123
6111	Fire fighters	50.9583	157
8217	Fish canners, curers, and packers	18.2394	499
7313	Fishermen: net, trap and line	18.6296	498
7319	Fishing, hunting, trapping, and related occupations, n.e.c.	22.7447	482
8211	Flour and grain millers	28.9914	410
6129	Food and beverage preparation and related service occupations, n.e.c.	27.5225	428
8229	Food and beverage processors, n.e.c.	32.2390	367
9110	Foremen: air transport operating	61.7911	72
8550	Foremen: assembling and repairing textile, fur, and leather products	42.7460	245
8540	Foremen: assembling and repairing wood products	41.6081	254
8530	Foremen: assembling, installing, and repairing electrical, electronic, and related equipment	55.8867	118
8160	Foremen: chemicals, petroleum, rubber, and plastic materials processing	57.0673	108
8370	Foremen: clay, glass, stone, and related materials machining	44.4470	228
8150	Foremen: clay, glass, and stone processing, forming, and related	47.0419	200
8730	Foremen: electrical power, lighting, and wire communications erecting, installing and repairing	56.0063	117
9550	Foremen: electronic communications equipment operating, n.e.c.	65.5887	52
8710	Foremen: excavating, grading, and paving	38.9193	290
8510	Foremen: metal products assembling, n.e.c.	54.2590	132
8570	Foremen: fabricating, assembling, and repairing, plastic and related products	49.0253	182
8210	Foremen: food and beverage processing	45.9770	211
7510	Foremen: forestry and logging	38.0623	304

Table A-1 (cont'd.)

Classification number	Occupations	Socio-economic index	Rank
9310	Foremen: materials handling, n.e.c.	43.8969	236
8580	Foremen: mechanics and repairmen, except electrical	45.0002	221
8310	Foremen: metal machining	52.1729	151
8130	Foremen: metal processing and related	51.4055	154
8330	Foremen: metal shaping and forming, except machining	47.4094	197
7710	Foremen: mine, quarry, oil and gas field	49.9946	168
8110	Foremen: mineral ore treating	53.8963	136
9170	Foremen: motor transport operating	40.9698	267
8780	Foremen: other construction trades	42.4216	247
9590	Foremen: other crafts and equipment operating, n.e.c.	59.1308	92
7180	Foremen: other farming, horticultural, and animal husbandry occupations	35.8990	321
8390	Foremen: other machining and related	46.6586	204
8290	Foremen: other processing occupations	46.5696	206
9190	Foremen: other transport and related equipment operating	54.5601	130
9510	Foremen: printing and related	52.9503	142
8590	Foremen: product assembling and repairing, n.e.c.	47.9736	192
8250	Foremen: pulp and papermaking	52.4163	145
9130	Foremen: rail transport operating	50.4002	163
9530	Foremen: stationary engine and utilities equipment operators and related	53.4982	138
8260	Foremen: textile processing	44.7037	226
8350	Foremen: wood machining	40.2551	276
8230	Foremen: wood processing, except pulp and papermaking	40.2219	277
7519	Forestry and logging occupations, n.e.c.	19.3280	496
7511	Forestry conservationists	31.8739	375
8331	Forgers	33.8487	346
8155	Forming occupations: clay, glass, and stone	31.2890	381
8221	Fruit and vegetable canners, preservers, and packers	26.4676	450
6141	Funeral directors, embalmers, and related	51.3475	155
8151	Furnace and kiln men: clay, glass, and stone	32.9690	356
8555	Furriers	24.9863	461
1130	General managers and senior officials	66.6958	44
4197	General office clerks	46.4416	208
2112	Geologists	69.2159	25
8795	Glaziers	31.5716	377
1113	Government administrators	68.6724	31
6115	Guards and watchmen	28.7070	417
6144	Guides	28.2021	421
3119	Health diagnosing and treating, n.e.c.	57.1236	107
8295	Hide and pelt processors	25.6631	457
9311	Hoist operators, n.e.c.	37.8511	306
6145	Hostesses and stewards, except food	41.1612	261
4194	Hotel clerks	30.0380	393
7315	Hunters, trappers, and related	14.3963	500
9916	Inspectors, testers, graders, and samplers, n.e.c.	47.0743	199
8536	Inspectors, testers, graders, and samplers: assembling, installing, and repairing electronic equipment	48.8063	183
8546	Inspectors, testers, graders, and samplers: assembling and repairing wood products	19.7729	494
8176	Inspectors, testers, graders, and samplers: chemical, petroleum, rubber, plastic, and related materials processing	52.4039	146
8376	Inspectors, testers, graders, and samplers: clay, glass, and stone machining	29.2692	407
8156	Inspectors, testers, and samplers: clay, glass, and stone processing	39.9696	279
8796	Inspectors, testers, graders, and samplers: construction, except electrical	49.1070	179
8586	Inspectors, testers, graders, and samplers: equipment repair, except electrical	44.5760	227
8566	Inspectors, testers, graders, and samplers: fabricating, assembling, and repairing textile, fur, and leather products	27.6826	426
8576	Inspectors, testers, graders, and samplers: fabricating, assembling, repairing, rubber, plastic, and related products	40.9796	266
8226	Inspectors, testers, graders, and samplers: food, beverage, and related processing	39.0159	288
8396	Inspectors, testers, graders, and samplers: machining, n.e.c.	39.8583	280
8316	Inspectors, testers, graders, and samplers: metal machining	45.1924	219
8146	Inspectors, testers, graders, and samplers: metal processing	48.3808	188
8526	Inspectors, testers, graders, and samplers: metal product assembling, n.e.c.	45.5382	216
8336	Inspectors, testers, graders, and samplers: metal shaping, except machining	46.4617	207
8116	Inspectors, testers, graders, and samplers: mineral ore treating	47.8694	193

Table A-1 (cont'd.)

Classification number	Occupations	Socio-economic index	Rank
8736	Inspectors, testers, graders, and samplers: power lighting and wire communication erecting, installing, and repairing	59.5654	89
8296	Inspectors, testers, graders, and samplers: processing, n.e.c.	36.9336	315
8596	Inspectors, testers, graders, and samplers: product fabricating and repairing, n.e.c.	38.6001	293
8256	Inspectors, testers, graders, and samplers: pulp and papermaking	55.5257	121
8276	Inspectors, testers, graders, and samplers: textile processing	27.4283	429
8356	Inspectors, testers, graders, and samplers: wood machining	24.6923	465
8236	Inspectors, testers, graders, and samplers: wood processing except pulp-making	32.5377	362
2145	Industrial engineers	67.1195	39
8523	Industrial, farm, and construction machinery assemblers	33.2208	352
8584	Industrial, farm, and construction machinery mechanics and repairmen	41.4781	256
1116	Inspectors, government	59.7212	88
1176	Inspectors, nongovernment	54.2791	131
2797	Instructors and training officers, n.e.c.	56.3952	116
8786	Insulaters, construction	34.7941	335
4135	Insurance, bank, and other finance clerks	49.6863	173
5171	Insurance salesmen and agents	57.7196	102
6191	Janitors, charworkers, and cleaners	24.9784	462
8591	Jewelry and silverware fabricators and repairmen	32.5292	363
2341	Judges and magistrates	72.0631	12
8271	Knitters	22.0573	486
9918	Labourers, n.e.c.	27.6005	427
8578	Labourers: assembling and repairing rubber, plastic, and related products	29.7354	400
8568	Labourers: assembling and repairing textile, fur, and leather products	21.8708	487
8538	Labourers: assembling, installing, and repairing electrical, electronic, and related equipment, n.e.c.	28.7140	415
8178	Labourers: chemical, petroleum, rubber, and plastic materials processing	34.0719	345
8158	Labourers: clay, glass, and stone processing and forming	25.8264	454
8548	Labourers: fabricating, assembling, and repairing wood products	22.1647	485
8228	Labourers: food and beverage processing	25.9034	453
7518	Labourers: forestry and logging	24.8347	464
9921	Labourers: manufacturing	29.0274	409
9318	Labourers: material handling	29.9291	395
8148	Labourers: metal processing	34.8435	333
8528	Labourers: metal products assemblers, n.e.c.	27.2044	433
7718	Labourers: mine, quarry, oil and gas fields	33.2949	351
8118	Labourers: mineral ore treating	37.7532	308
8798	Labourers: other construction trades	27.0100	437
9926	Labourers: other industries	26.8178	440
8298	Labourers: other processing	25.6716	455
9518	Labourers: printing and related	34.6923	337
8598	Labourers: product fabricating, assembling, and repairing, n.e.c.	28.7094	416
9925	Labourers: public administration and defence	25.6058	459
8258	Labourers: pulp and papermaking	36.7853	316
9924	Labourers: service	26.5015	448
6198	Labourers: services	26.5539	446
8278	Labourers: textile processing	20.7319	489
9923	Labourers: trade	26.7645	442
9922	Labourers: transportation and communication	28.6236	419
8238	Labourers: wood processing, except pulp	26.0082	452
6162	Launderers and dry cleaners	24.2647	471
2343	Lawyers and notaries	72.7302	9
2351	Librarians and archivists	61.8705	70
4161	Library and file clerks	45.5775	215
4169	Library, file, correspondence clerks, and related clerks, n.e.c.	54.6357	129
2135	Life sciences technicians	55.3551	126
9131	Locomotive engineers and firemen	46.3239	209
6139	Lodging and other accommodation, n.e.c.	26.5112	447
7517	Log hoisters, sorters, and movers	30.3240	390
7516	Log inspectors, graders, and scalers	39.2284	284
9313	Longshoremen, stevedores, and freight handlers	32.4366	365
8315	Machine tool operators	37.6640	310
8313	Machinist and machine tool setters	41.9239	250
4173	Mail and postal clerks	48.0802	191

Table A-1 (cont'd.)

Classification number	Occupations	Socio-economic index	Rank
4172	Mail carriers	41.7737	252
1145	Managers: construction operations	55.4962	122
6131	Managers: hotel, motel, and other accommodation	39.0288	287
1131	Managers: science and engineering	74.4373	4
1132	Managers: social sciences and related fields	66.8855	43
1147	Managers: transport and communications	60.9983	79
8592	Marine craft fabricators and repairmen	33.3758	350
4159	Material recording, scheduling, and distributing occupations, n.e.c.	39.8265	282
9315	Material handling equipment operators, n.e.c.	31.9098	373
9319	Material handlers, and related, n.e.c.	32.5434	361
2181	Mathematicians, statisticians, and actuaries	66.9806	41
2147	Mechanical engineers	67.5427	36
8589	Mechanics and repairmen, except electrical, n.e.c.	37.6721	309
3156	Medical lab. technologists and technicians	56.8694	111
8115	Melters and roasters, mineral ores	42.0305	249
1111	Members of legislative bodies	56.8551	112
4177	Messengers	30.1310	391
8141	Metal extruders and drawers	38.1482	303
8133	Metal heat treaters	38.9896	289
8319	Metal machining occupations, n.e.c.	29.3887	406
8149	Metal processing, and related, n.e.c.	35.0812	332
8135	Metal rolling-mill operators	41.0819	262
8339	Metal shapers, except machining, n.e.c.	36.2515	320
8131	Metal smelting, converting, and refining furnacemen	39.4135	283
2151	Metallurgical engineers	71.6364	16
8334	Metalworking-machine operators, n.e.c.	31.6284	376
2114	Meteorologists	72.8036	8
8223	Milk processors	30.9860	385
8557	Milliners, hat and cap makers	20.6313	490
8119	Mineral ore treaters, n.e.c.	42.5039	246
7717	Mine and quarry: cutters, handlers, and loaders	34.3501	341
7719	Mine, quarry, and oil and gas field occupations, n.e.c.	40.6229	270
2153	Mining engineers	68.7107	29
2511	Ministers of religion	50.4228	162
8161	Mixers and blenders, chemicals	36.6975	317
8113	Mixers, separators, filterers, and related occupations, mineral ores	43.8922	237
9557	Motion picture projectionists	43.2204	241
9179	Motor transport operators, n.e.c.	39.8416	281
8513	Motor vehicle assemblers, n.e.c.	34.7114	336
8581	Motor vehicle mechanics and repairmen	32.8137	358
9193	Motormen and dinkeymen, except rail transport	37.8323	307
8573	Moulders: rubber, plastic, and related products	31.0887	384
8137	Moulders, coremakers, and metal casters	32.6249	360
3332	Musicians	43.3157	240
5143	Newsboys	19.2430	497
2157	Nuclear engineers	74.7182	2
2513	Nuns and brothers (w) n.o.r.	46.6069	205
7195	Nursery and related workers	28.0194	423
3133	Nurses-in-training	49.8921	170
3131	Nurses, graduate, except supervisors	51.3173	156
3135	Nursing aides and orderlies	32.2890	366
3134	Nursing assistants	36.5502	318
3139	Nursing, therapy and related assisting occupations, n.e.c.	38.2307	301
2333	Occupations in community welfare	49.2108	178
3319	Occupations in fine and commercial art, photography and related fields, n.e.c.	45.9477	212
2139	Occupations in life sciences, n.e.c.	52.3517	149
3339	Occupations in performing and audiovisual arts, n.e.c.	40.5122	272
2119	Occupations in physical sciences, n.e.c.	49.0506	181
2519	Occupations in religion, n.e.c.	35.7054	323
2319	Occupations in social sciences, n.e.c.	60.9556	80
3359	Occupations in writing, n.e.c.	66.2099	47
4141	Office machine operators	44.3225	231
1119	Officials and administrators unique to government, n.e.c.	58.8662	94
3153	Optometrists	74.2831	5

Table A-1 (cont'd.)

Classification number	Occupations	Socio-economic index	Rank
3117	Osteopaths and chiropractors	71.2672	17
4199	Other clerical and related, n.e.c.	48.7367	184
8799	Other construction trades occupations, n.e.c.	34.3978	379
9599	Other crafts and equipment operating occupations, n.e.c.	44.1848	234
2739	Other elementary and secondary school teaching occupations, n.e.c.	55.5801	120
8529	Other fabricating and assembling of metal products, n.e.c.	34.1891	343
7199	Other farming, horticultural, and animal husbandry occupations, n.e.c.	29.6735	401
8399	Other machining and related, n.e.c.	40.5645	271
1149	Other managers and administrators, n.e.c.	63.9995	62
1154	Other managers, construction	58.4063	98
1152	Other managers, durable goods manufacture	66.3979	46
1151	Other managers, mines and oil wells	68.6711	32
1153	Other managers, nondurable goods manufacture	64.6404	57
1158	Other managers, other industries	65.2116	53
1157	Other managers, service	64.8013	55
1156	Other managers, trade	58.8655	95
1155	Other managers, transportation and communication	64.3958	60
2169	Other occupations in architecture and engineering, n.e.c.	40.4515	273
9919	Other occupations, n.e.c.	34.1703	344
8299	Other processing occupations, n.e.c.	27.4241	430
8599	Other products fabricating, assembling, and repairing occupations, n.e.c.	32.1822	369
6117	Other ranks, armed forces	43.1314	242
7713	Other rock and soil drillers	35.5183	325
5199	Other sales occupations, n.e.c.	44.1485	235
6199	Other service occupations, n.e.c.	29.6090	403
9199	Other transport and related equipment operators, n.e.c.	26.6524	445
2719	Other university teaching, n.e.c.	52.2331	150
2349	Others in law and jurisprudence, n.e.c.	52.6475	143
2359	Others in library, museum, and archival sciences, n.e.c.	44.7284	225
2189	Other in mathematics, statistics, systems analysis, and related fields, n.e.c.	57.2225	106
3159	Others in medicine and health, n.e.c.	44.7832	224
2399	Others in social sciences and related fields, n.e.c.	57.9668	100
2339	Others in social work and related fields, n.e.c.	54.0327	134
3379	Others in sports and recreation, n.e.c.	22.2337	484
2799	Others in teaching and related, n.e.c.	55.4041	125
1179	Others related to management, n.e.c.	64.7042	56
9317	Packaging occupations, n.e.c.	31.1612	382
8785	Painters, paperhangers, and related	28.8448	412
3311	Painters, sculptors, and related artists	39.0343	286
8595	Painters and decorators, except construction	30.3390	389
8593	Paper product fabricators	35.2914	329
8253	Papermakers and finishers	46.9033	201
8395	Patternmakers and mould makers, n.e.c.	47.2699	198
8551	Patternmakers, markers, and cutters of textile, fur, and leather products	27.3972	431
8713	Pavers, surfacers, and related	25.6197	458
6149	Personal service occupations, n.e.c.	30.1133	392
1136	Personnel and related managers	63.1203	63
1174	Personnel and related officers	65.7001	51
4195	Personnel clerks	56.9941	110
2154	Petroleum engineers	69.7069	21
3151	Pharmacists	72.1743	11
9515	Photoengravers and related	49.8940	169
3315	Photographers and cameramen	49.5214	175
9591	Photographic processing occupations	44.8545	223
2117	Physical science technologists and technicians	60.4386	84
3111	Physicians and surgeons	74.2246	6
2113	Physicists	68.7922	27
3137	Physio and occupational therapists	53.5215	137
9111	Pilots, navigators, and flight engineers	67.8389	35
8791	Pipefitters, plumbers, and related	37.6162	312
8355	Planers, turners, shapers, and related wood machinists	25.6634	456
8784	Plasterers and related occupations	30.4749	387
8143	Platers, metal sprayers, and related	33.6194	348
8233	Plywood makers and related	32.4753	364

Table A-1 (cont'd.)

Classification number	Occupations	Socio-economic index	Rank
6112	Policemen and detectives, government	60.1046	85
6113	Policemen and investigators, private	45.6711	213
2793	Postsecondary school teachers, n.e.c.	69.2577	24
1115	Postmasters	49.1020	180
8738	Power, lighting, and wire communications erecting and repairing labourers	33.0574	354
8739	Power, lighting, and wire communications installing and repairing, n.e.c.	48.2167	190
9531	Power station operators	54.8191	128
8527	Precision instrument assemblers, n.e.c.	38.2462	300
8588	Precision instrument mechanics	57.8979	101
6165	Pressing occupations	20.5893	491
9519	Printing and related occupations, n.e.c.	37.0982	314
9514	Printing engravers, except photoengravers	50.3028	164
9512	Printing press operators	41.5833	255
3330	Producers and directors: performing and audiovisual arts	67.0394	40
3313	Product and interior designers	53.0155	141
4151	Production clerks	50.4406	161
1143	Production managers	62.7272	65
6119	Protective service occupations, n.e.c.	41.0713	265
2315	Psychologists	62.2645	67
8259	Pulp and papermakers and related, n.e.c.	41.4186	257
1141	Purchasing managers	61.8599	71
1175	Purchasing officers and buyers, except wholesale and retail trade	60.7041	82
3337	Radio and television announcers	58.5342	97
9551	Radio and television broadcasting equipment operators	56.5194	115
8537	Radio and television service repairmen	43.0365	243
3155	Radiology technologists and technicians	58.7227	96
8583	Rail transport equipment mechanics	39.0343	285
9139	Rail transport operators, n.e.c.	30.6828	386
9135	Rail transport operating, support	44.4045	229
8715	Railway sectionmen and trackmen	24.0700	473
5172	Real estate salesmen	50.0692	167
4179	Reception, information, mail, and message distribution occupations, n.e.c.	42.7816	244
4171	Receptionists and information clerks	40.6897	269
3371	Referees and related officials	38.5612	295
8167	Roasters, cookers, and dryers: chemicals and related materials	36.3204	319
8787	Roofers, waterproofers, and related	26.9817	438
7711	Rotary well-drilling and related	41.0808	263
1137	Sales and advertising managers	65.1050	54
5137	Sales clerks, commodities	38.3541	297
5149	Sales occupations: commodities, n.e.c.	41.4111	258
5179	Sales occupations: services, n.e.c.	52.4014	148
5135	Salesmen and salespersons, commodities, n.e.c.	43.7909	239
5173	Salesmen and traders, securities	59.7802	86
8231	Sawmill sawyers and related	26.9558	439
2733	Secondary school teachers	71.7725	15
4111	Secretaries and stenographers	52.4455	144
8153	Separators, grinders, crushers, and mixers: clay, glass, and stone	27.3214	432
5145	Service station attendants	29.6593	402
1142	Service managers	57.9985	99
8563	Sewing machine operators, textile and similar materials	23.2175	478
8333	Sheet metal workers	37.6528	311
4153	Shipping and receiving clerks	34.4410	340
8561	Shoemakers and repairers	19.9182	493
8215	Slaughterers, meat cutters, canners, curers, and packers	31.1280	383
6135	Sleeping car and baggage porters, and bellmen	28.8280	413
2331	Social workers	61.6410	74
2313	Sociologists, anthropologists, and related	60.5728	83
9555	Sound recording and reproduction equipment operators	58.8836	93
9539	Stationary engine and utilities equipment operators and related, n.e.c.	41.3749	259
4137	Statistical clerks	51.5852	152
9513	Stereotypers and electrotypers	45.3223	218
4155	Stock clerks and related occupations	38.5252	296
5141	Street vendors and door-to-door salesmen	32.0964	372

Table A-1 (concl'd.)

Classification number	Occupations	Socio-economic index	Rank
8793	Structural metal erectors	35.8482	322
9191	Subway and street railway operators	44.3000	232
8225	Sugar processors	35.3198	328
9910	Supervisors and foremen, n.e.c.	46.2227	210
4130	Supervisors: bookkeeping, account recording, and related occupations	61.4871	76
6120	Supervisors: food and beverage preparation and related services	37.2441	313
6160	Supervisors: laundry and dry cleaning occupations	40.3394	275
4160	Supervisors: library, file, and correspondence clerks	64.1414	61
2350	Supervisors: library, museum, and related	62.1512	68
6130	Supervisors: lodging and other accommodation	35.6811	324
4150	Supervisors: material recording, scheduling, and distributing	49.6442	174
3130	Supervisors: nursing occupations	57.0085	109
4140	Supervisors: office machine and EDP equipment operators	68.6739	30
4190	Supervisors: other clerical, n.e.c.	61.3559	77
2160	Supervisors: other occupations in architecture and engineering	67.1897	38
5190	Supervisors: other sales occupations	47.4196	196
6190	Supervisors: other service occupations	38.2848	298
4170	Supervisors: reception, mail, and message distribution occupations	56.6130	114
5130	Supervisors: sales occupations, commodities	47.6628	195
5170	Supervisors: sales occupations, services	61.5618	75
4110	Supervisors: stenographic and typing	56.8004	113
2161	Surveyors	54.1410	133
2183	Systems analysts and computer programmers	68.7215	28
8553	Tailors and dressmakers	24.2752	470
9173	Taxi drivers and chauffeurs	26.6796	444
2795	Teachers, exceptional students, n.e.c.	53.2098	139
5131	Technical salesmen and related advisers	64.4944	58
2353	Technicians: library, museum, and related	44.4040	230
9553	Telegraph operators	50.9492	158
4175	Telephone operators	38.2805	299
4133	Tellers and cashiers	40.4164	274
8273	Textile bleachers and dyers	24.4136	468
8261	Textile fibre preparers	19.6522	495
8275	Textile finishers and calenderers	23.4167	476
8279	Textile processing occupations	24.3613	469
8263	Textile spinners and twisters	22.5059	483
8267	Textile weavers	21.7177	488
8265	Textile winders and reelers	24.4378	467
7513	Timber cutters and related	22.8047	481
8293	Tobacco processors	34.2377	342
8311	Tool and die makers	52.4026	147
3355	Translators and interpreters	61.6940	73
4193	Travel clerks, ticket, station, and freight agents	55.0394	127
9175	Truck drivers	29.7365	399
9511	Typesetters and compositors	45.0035	220
4113	Typists and clerk typists	45.4604	217
2711	University teachers	72.2955	10
8562	Upholsterers	27.1699	434
3115	Veterinarians	73.4877	7
2791	Vocational school teachers	66.1264	48
6125	Waiters, hostesses, and stewards: food	28.0074	424
8587	Watch and clock repairmen	40.0036	278
9159	Water transport operators, n.e.c.	35.3916	327
4157	Weighers	35.2532	330
8335	Welders and flame cutters	35.1540	331
8735	Wire communications and related equipment installers and repairers	59.3454	90
8359	Wood machining occupations, n.e.c.	28.8047	414
8351	Wood patternmakers	48.4971	187
8239	Wood processors, except pulp, n.e.c.	29.5722	404
8357	Wood sanders	20.3135	492
8353	Wood sawyers and related, except sawmill	23.6649	475
8235	Wood treating occupations	34.6748	338
3352	Writers and editors	62.8184	64

SOURCE Blishen B. R. and H. A. McRoberts, "A Revised Socioeconomic Index for Occupations in Canada, *Canadian Review of Sociology and Anthropology*," 13(1), 1976.

Appendix B

Appendix to Chapter 5

The Life Cycle of a Typical Timber Stand

Chart B-1 depicts the standard timber volume/age relationship for a timber stand on a fixed area of land. When the stand is young, the volume of timber is negligible; later, it begins to increase at a faster rate, peaks, and thereafter grows at a decreasing rate. At some point, the expected stand volume may decline because of the increasing susceptibility of stands to pests, fire, and windstorms. Point *A* on the curve is noteworthy. It can be shown that the choice of T_A years as the rotation period would ensure that the site produced the maximum volume of timber possible through time. A "normal" or fully regulated forest would consist of multiple sets of stands. Each set would have many sites ($T_A + 1$), ranging in age all the way from 0 years (a site freshly harvested and replanted) to T_A years (a site ready for harvesting). In each year, each stand of age T_A in every set would be harvested and all such sites immediately replanted. Through time, the forest would yield a perpetual flow of timber of V_A cubic metres per annum from every set of stands. This is the maximum annual harvest possible from the "ideal" forest. Surprisingly, V_A is not the socially most valuable annual harvest, even though it is the largest in quantity.

The existence of large stocks of mature timber makes the transition from the virgin forest to the fully regulated or normal forest somewhat difficult if the primary objective is to achieve the most even flow possible of timber. A rapid depletion of the stock of mature timber will leave gaps in the age distribution of stands and lead to interruptions in the flow of harvestable timber from the forest base. The stock of mature timber must therefore be allocated in some fashion over the rotation age adopted for the forest. If a particular forest area consists of mature stands of age T_C in Chart B-1, the average timber volume per hectare harvested will be between V_A and V_C, and it will exceed the ultimate maximum possible annual yield of V_A from the regulated forest.

There are various ways of allocating the stock of mature timber over the harvest cycle in order to ensure a reasonably smooth flow of timber from the harvest base, if this is desired. Regardless of the formula chosen, the annual allowable cut for a timber management unit during the transition from a natural forest with large stocks of mature timber cannot be constant. Chart B-2 depicts the flow of timber from a mature forest regulated so as to achieve a steady approach to the maximum sustainable annual yield. The initial allowable cut is high and reflects the large stock of timber from the mature timber stands; but as the proportion of mature timber in the management unit declines, so will the allowable cut. At the end of the first rotation cycle, when the last of the mature timber stands have been harvested, the allowable cut will be constant at volume V_A – the maximum sustained yield of the timber management unit. The falldown in the allowable annual cut, depicted in Chart B-2, reflects nothing more than the depletion of mature timber stands and their replacement by second-growth stands managed on a maximum-sustained-yield basis. It is a totally predictable outcome of the transition from a natural forest to one regulated on a sustained-yield basis.

The harvest rate path denoted by *A* in Chart B-3 would not be permitted in British Columbia, since it would lead to a subsequent period of harvests below the maximum sustained yield. Under present practices, this is so, irrespective of whether or not path *A* is socially more beneficial, as it could easily be. A harvest rate target path like *B*, on the other hand, would be acceptable.

Chart B-1

Timber Volume/Age Relationship

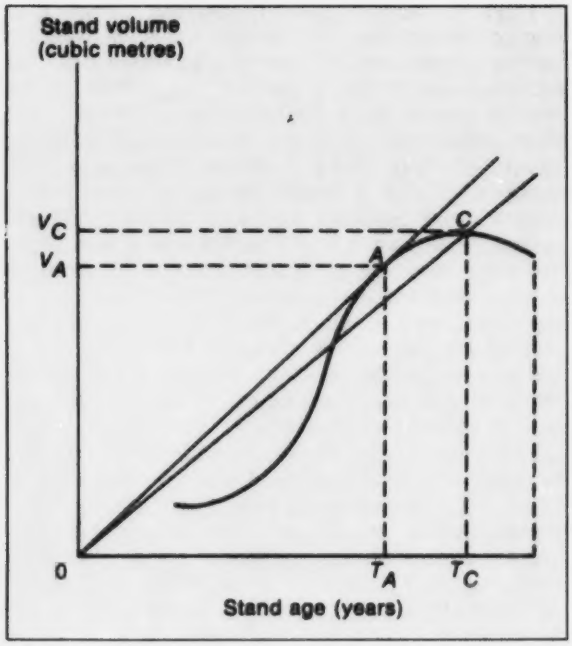


Chart B-2

Flow of Wood from Mature Forest Managed on a Sustained-Yield Basis

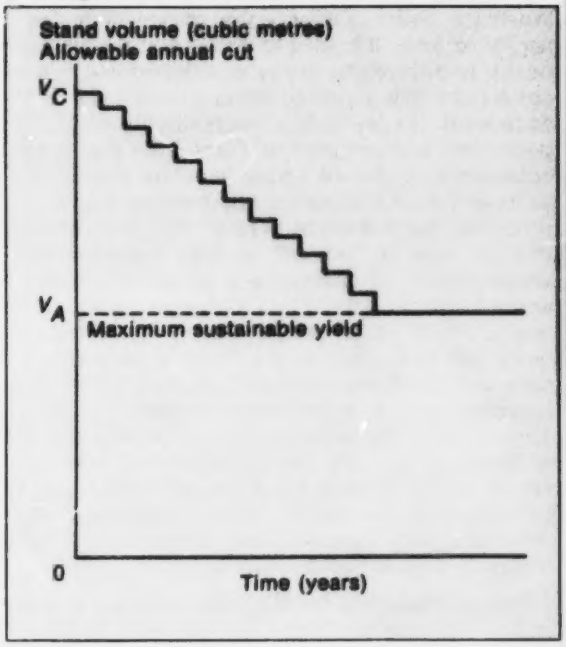
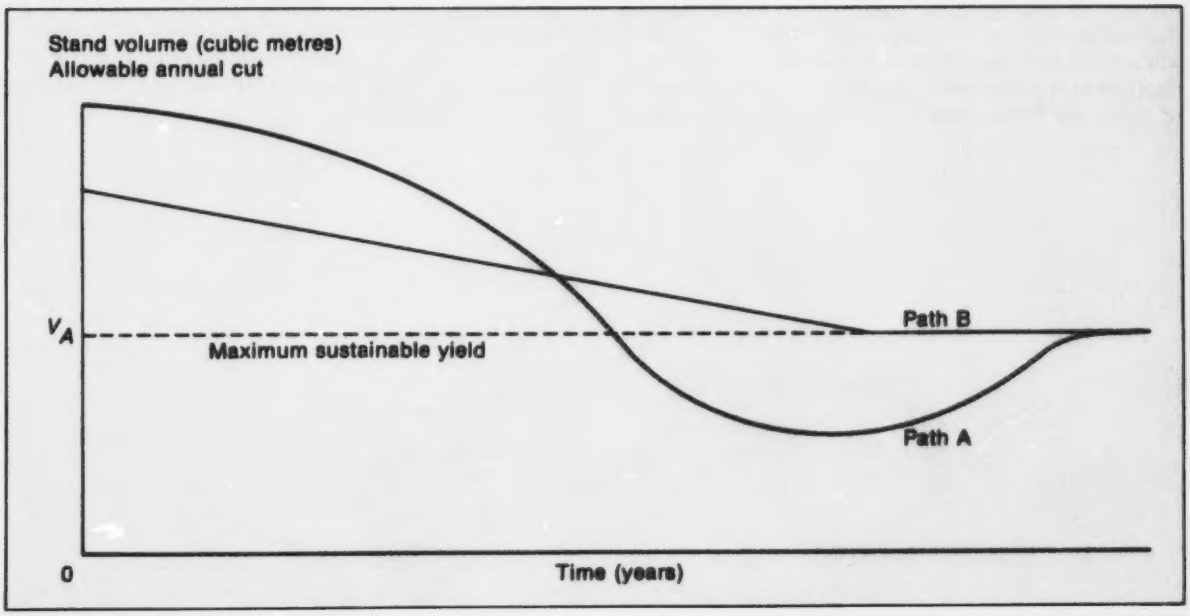


Chart B-3

Alternate Harvest Paths



Appendix C

Appendix to Chapter 11

Table C-1

Indexes of Employment Growth in the Service Industries, by Province, Canada, 1971-81

	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Canada
					(All-industry average = 100.0)						
Community, business, and personal services	163.6	210.5	190.3	179.6	180.4	179.0	221.6	198.2	127.5	152.8	169.6
Education and related services	125.6	119.4	120.8	100.3	97.6	78.4	121.6	93.0	59.6	112.1	89.0
Kindergarten and nursery schools	2,485.1	555.6	608.1	345.3	69.2	190.9	490.4	-163.0	61.3	45.3	137.2
Elementary and secondary schools	102.8	74.0	93.5	74.2	63.4	57.4	116.1	80.2	56.4	99.4	68.9
Schools of art and of performing arts	119.3	-105.7	231.5	195.2	265.3	63.7	24.8	-44.5	24.5	50.6	77.3
Vocational centres, trade schools and business colleges	156.5	512.7	38.6	-87.4	42.9	54.1	-57.3	151.1	72.7	177.5	81.4
Postsecondary nonuniversity educational establishments	372.8	2,381.0	190.3	680.5	225.5	301.8	509.2	881.1	177.0	581.3	278.8
Universities and colleges	191.8	57.1	163.9	119.2	194.7	73.0	106.9	56.4	47.1	103.4	104.1
Libraries, museums and other repositories	242.3	1,723.5	540.8	700.6	330.8	203.6	245.0	407.5	130.9	184.0	221.4
Other education and related services	596.4	-317.5	-18.4	-	348.9	100.6	101.8	503.5	4.0	168.5	154.3
Health and welfare services	193.0	219.0	227.1	186.8	210.6	153.5	243.1	227.3	100.5	160.8	168.1
Hospitals	92.8	112.4	124.6	85.0	132.9	55.3	78.4	84.1	63.8	109.1	89.5
Related health care institutions	843.3	871.1	1,995.0	4,658.9	2,477.2	552.6	2,688.1	1,941.0	261.2	967.4	750.3
Offices of physicians and surgeons	139.6	274.6	249.8	153.5	312.5	120.1	135.8	104.0	77.7	96.0	145.2
Offices of paramedical personnel	39.8	-79.4	142.9	133.3	377.2	364.9	214.7	67.0	138.4	159.6	273.0
Offices of dentists	331.4	793.7	633.3	294.9	485.9	306.6	521.6	194.7	198.5	257.2	323.2
Diagnostic and therapeutic services	437.4	873.0	109.7	248.6	188.3	677.5	526.1	621.1	246.4	306.8	425.3
Miscellaneous health services	-18.1	2,539.7	52.0	42.9	59.9	576.9	135.8	-18.1	198.8	106.0	286.0
Welfare organizations	1,570.6	215.2	393.5	368.5	499.5	352.3	467.4	525.6	228.7	335.1	384.9
Religious organizations	142.7	80.6	40.2	45.6	72.4	76.3	151.4	54.6	77.4	103.0	75.8
Amusement and recreation services	328.4	156.8	283.5	269.9	271.9	247.4	214.2	217.6	96.8	116.8	208.7
Motion picture theatres	173.9	-35.2	47.4	-21.9	126.0	51.1	4.1	-48.5	-8.2	43.6	43.9
Motion picture production and distribution	16.5	-317.5	726.8	600.6	192.0	307.8	82.1	377.5	130.3	93.0	216.1
Bowling alleys and billiard parlours	66.2	-63.5	13.7	-63.4	65.5	72.7	-174.8	98.7	-4.8	10.0	31.4
Golf clubs and country clubs	24.9	-186.7	91.9	163.7	140.8	73.9	121.1	7.0	76.3	88.9	88.0
Theatrical and other staged entertainment	165.6	1,111.1	467.3	158.0	374.0	391.6	154.1	84.6	183.4	311.5	323.5
Miscellaneous amusement and recreation	655.7	282.2	465.4	628.8	350.1	350.8	483.5	613.7	140.4	122.8	293.1

Table C-1 (concl'd.)

	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Canada[1]
	(All-industry average = 100.0)										
Services to business management	274.4	457.8	343.6	319.2	279.0	361.3	510.5	574.4	352.4	258.7	332.4
Employment agencies and personnel services	364.4	529.2	53.0	184.1	200.3	516.5	416.1	162.1	438.7	273.2	384.2
Computer services	298.2	-317.5	4,309.3	2,852.9	814.6	2,025.5	3,022.0	7,753.3	1,143.2	1,004.0	1,466.6
Security and investigation services	872.9	170.8	190.7	221.6	327.9	318.9	458.7	470.5	284.3	308.3	308.4
Offices of accountants	172.6	992.1	209.9	247.7	217.5	248.0	285.3	370.5	204.0	169.1	227.0
Advertising services	198.8	2,539.7	411.2	951.1	118.8	245.3	444.5	576.2	296.3	156.6	205.4
Offices of architects	54.3	952.4	227.4	480.5	135.0	185.6	152.8	528.6	435.8	390.8	251.3
Engineering and scientific services	184.9	586.0	341.1	293.7	245.6	254.1	614.7	482.4	362.9	190.4	287.5
Offices of lawyers and notaries	319.9	246.9	313.1	302.7	196.6	242.3	369.7	535.7	287.9	249.8	246.4
Offices of management and business consultants	3,578.5	211.7	1,845.2	1,801.8	933.9	1,126.4	1,269.3	1,636.1	865.0	1,142.5	1,079.1
Miscellaneous services to business management	298.2	432.2	343.6	315.9	415.4	417.7	720.2	885.5	332.0	262.1	391.3
Personal services	24.3	30.2	-22.7	-21.0	12.9	15.9	-66.1	-111.9	19.3	6.2	6.9
Shoe repair shops	-113.5	-	-97.5	-21.3	-63.4	-70.0	-261.9	-97.8	-32.7	-49.1	-64.5
Barber and beauty shops	127.2	186.7	100.9	65.5	41.9	33.0	41.3	30.0	58.5	54.7	45.7
Private households	-16.3	-13.7	-95.0	-78.1	-34.5	12.6	-101.4	-216.7	-50.1	-56.8	-37.0
Laundry cleaning and pressing	-13.5	-116.8	-62.6	-21.0	-6.1	-2.7	-116.1	-63.0	31.6	5.1	-3.3
Self-service laundries and dry cleaners	49.7	3,174.3	487.3	500.6	-46.9	82.9	306.0	-60.8	12.6	132.6	78.6
Funeral services	372.8	-31.7	-4.0	160.1	84.6	44.4	-110.1	134.8	72.5	-3.4	48.0
Miscellaneous personal services	278.2	-123.5	76.6	-56.8	125.5	5.1	-140.4	-247.6	68.8	60.0	36.2
Accommodation and food services	173.4	384.8	296.3	381.7	260.7	306.3	318.3	344.9	180.9	190.8	258.2
Hotels and motels	218.1	208.9	257.0	366.7	154.1	179.9	208.7	211.9	142.4	100.8	163.5
Lodging houses and residential clubs	-142.7	-284.1	-231.2	-275.7	-212.5	-227.9	-367.0	-322.0	-49.9	-119.2	-189.5
Camping grounds and trailer parks	1,838.9	436.5	230.8	320.4	380.9	181.7	200.9	156.8	83.4	94.9	202.6
Restaurants, caterers, and taverns	178.7	560.6	368.2	450.5	329.4	412.6	439.0	515.9	218.9	274.9	339.8
Miscellaneous services	306.4	490.2	363.6	370.6	389.7	283.5	319.3	415.9	203.5	184.0	289.3
Labour organizations and trade associations	174.8	115.6	96.6	166.9	216.4	130.3	170.2	172.7	101.7	85.7	143.9
Photographic services n.e.s.	447.3	634.9	220.2	369.1	292.0	333.9	375.7	456.8	227.5	245.1	294.9
Automobile and truck rental	437.4	1,269.8	529.6	200.3	319.6	516.5	458.7	793.0	213.3	379.4	405.6
Machinery and equipment rental	616.3	1,111.1	77.9	-142.3	240.1	117.4	100.5	289.4	179.5	193.2	165.6
Blacksmithing and welding shops	861.4	3,015.9	735.2	700.6	302.7	387.1	807.8	860.4	512.0	463.6	483.7
Miscellaneous repair shops	331.4	264.4	640.8	941.7	278.2	300.3	346.8	524.7	289.4	139.8	285.2
Services to buildings and dwellings	115.5	296.2	323.1	142.2	298.9	216.8	143.6	207.9	107.3	144.5	208.4
Miscellaneous services n.e.s.	698.8	449.2	482.2	547.1	859.7	416.2	461.5	539.2	239.8	222.1	437.0

Public administration and defence	126.6	90.2	48.6	85.6	146.4	69.1	115.6	140.1	78.2	128.9	98.5
Federal administration	118.7	35.2	-4.7	29.1	110.3	43.2	14.2	-1.8	8.9	40.8	44.1
Provincial administration	171.6	167.9	245.2	146.8	196.3	65.8	239.0	244.5	134.7	270.2	157.7
Local administration	216.3	310.8	227.7	279.3	145.9	127.0	218.3	295.2	136.6	214.7	157.7
Other government services	-173.0	-	-62.3	-120.1	-33.9	111.4	-	-	66.5	99.8	-65.8
Trade	109.3	121.6	144.2	128.2	159.9	140.5	140.8	196.0	119.8	114.3	138.3
Wholesale trade	103.2	30.5	136.8	150.2	175.6	171.2	135.3	236.6	131.9	105.8	153.3
Retail trade	111.9	158.4	146.7	121.3	154.1	128.8	143.1	181.1	114.9	117.9	132.7
Finance, insurance, and real estate	289.7	278.4	252.3	228.2	163.4	191.9	261.5	353.7	206.9	153.4	187.5
Finance industries	230.0	238.1	224.3	198.8	163.1	200.9	224.3	301.8	167.3	156.4	183.2
Insurance carriers	217.5	90.8	157.0	177.2	105.3	107.8	264.7	530.0	140.7	73.0	113.5
Insurance agencies and real estate	479.9	462.5	398.4	330.6	212.9	242.6	330.7	372.2	309.7	173.6	246.4
Transportation, communication, and other utilities	28.6	89.5	70.4	52.9	96.8	121.0	121.1	127.3	106.5	78.5	100.5
Transportation	19.7	91.4	56.7	12.0	68.2	98.5	131.2	96.0	106.3	70.6	82.9
Storage	318.1	-120.9	409.0	121.3	66.8	143.5	40.4	92.1	69.0	95.1	93.1
Communication	57.1	101.3	98.4	112.0	159.4	152.9	89.9	181.9	102.9	98.1	132.9
Electric power, gas, and water utilities	21.3	89.5	62.0	207.2	123.9	145.0	160.6	193.8	129.7	81.9	123.2
All industries[1]	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

1 Including primary; manufacturing; construction; and service industries.
SOURCE Based on data from Statistics Canada.

Table C-2

Distribution within Service Industry Groups of Increases in Employment, by Province, Canada, 1971-81

	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Canada[1]
						(Per cent)					
Community, business, and personal services											
Education and related services	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Kindergarten and nursery schools	1.9	3.3	2.6	2.3	0.3	2.7	2.3	-1.7	1.2	0.6	1.4
Elementary and secondary schools	63.5	46.2	54.7	55.2	49.1	50.8	68.2	62.0	64.6	63.0	55.3
Schools of art and of performing arts	0.5	-0.9	1.7	1.3	2.1	1.4	0.4	-1.2	1.1	1.1	1.4
Vocational centres, trade schools and business colleges	6.5	19.8	1.2	-3.2	0.4	0.4	-0.8	2.2	2.4	2.0	1.2
Postsecondary nonuniversity educational establishments	3.4	7.1	2.8	14.6	15.8	17.1	7.5	14.6	10.5	10.9	13.5
Universities and colleges	21.0	7.5	26.9	19.2	27.5	17.1	16.7	11.6	16.0	16.8	20.2
Libraries, museums and other repositories	3.0	17.9	10.1	10.6	3.3	9.9	5.2	10.8	4.2	5.0	6.3
Other education and related services	0.2	-0.9	-0.1	--	1.5	0.6	0.4	1.6	--	0.4	0.7
Health and welfare services	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Hospitals	39.6	33.0	39.8	34.6	48.3	23.5	21.6	24.9	43.1	42.0	36.7
Related health care institutions	15.3	29.9	24.4	32.3	5.4	19.4	35.3	36.0	9.4	5.8	14.1
Offices of physicians and surgeons	4.3	8.9	8.1	5.6	8.2	7.4	4.6	4.2	7.5	7.0	7.3
Offices of paramedical personnel	0.2	-0.6	0.7	1.0	2.5	3.9	1.0	0.4	2.4	1.9	2.5
Offices of dentists	2.6	4.2	4.8	3.2	4.6	7.2	5.0	2.1	6.6	7.6	5.8
Diagnostic and therapeutic services	1.3	3.1	0.7	1.4	0.7	6.3	3.8	2.3	4.1	3.1	3.2
Miscellaneous health services	-0.1	4.5	0.2	0.1	0.2	4.8	1.0	-0.1	2.5	1.3	1.9
Welfare organizations	36.8	17.0	21.4	21.8	30.2	27.6	27.6	30.0	24.4	31.2	28.5
Religious organizations	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Amusement and recreation services	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Motion picture theatres	7.4	-2.4	3.5	-1.7	4.4	2.6	0.3	-6.0	-1.5	4.5	2.8
Motion picture production and distribution	0.5	-2.4	6.1	4.3	7.0	7.6	1.6	2.8	5.5	3.0	6.4
Bowling alleys and billiard parlours	1.6	-2.4	0.6	-3.4	1.2	1.9	-7.5	5.1	-0.5	0.6	1.1
Golf clubs and country clubs	0.5	-24.4	3.8	10.3	7.5	5.4	9.1	0.5	10.9	8.9	6.6
Theatrical and other staged entertainment	7.9	34.1	18.3	4.3	15.7	18.4	11.3	4.6	19.3	23.7	17.4
Miscellaneous amusement and recreation	82.0	97.6	67.7	86.3	64.3	64.2	85.2	93.1	66.1	59.2	65.8

Services to business management	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Employment agencies and personnel services	2.1	4.5	0.9	2.8	2.9	7.8	4.8	1.2	6.0	4.3	5.6
Computer services	4.5	-0.9	8.4	2.8	7.2	13.6	6.9	7.5	7.3	8.0	9.8
Security and investigation services	19.1	6.4	8.3	11.2	11.4	6.6	8.6	6.8	4.5	5.4	7.3
Offices of accountants	11.2	22.7	9.2	11.8	12.4	8.9	10.7	12.7	9.2	11.3	10.2
Advertising services	1.7	7.3	3.3	8.4	3.4	5.5	3.9	4.4	3.0	3.3	4.3
Offices of architects	0.6	5.5	2.7	3.5	1.6	1.5	1.4	2.6	3.7	4.5	2.3
Engineering and scientific services	27.0	21.8	21.0	19.7	19.9	15.7	19.5	21.6	33.7	20.5	20.7
Offices of lawyers and notaries	14.0	12.7	18.5	19.6	12.3	12.7	14.5	19.8	12.0	16.8	13.4
Offices of management and business consultants	6.8	1.8	7.8	5.3	7.7	8.1	7.4	6.7	6.5	9.4	7.8
Miscellaneous services to business management	13.0	18.2	19.8	15.0	21.2	19.7	22.2	16.8	14.0	16.5	18.5
Personal services	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Shoe repair shops	-5.3	-	4.9	1.3	-11.2	-6.8	7.5	2.0	-3.9	-16.0	-17.5
Barber and beauty shops	97.3	193.3	-106.8	-80.0	103.8	67.1	-19.6	-7.4	94.2	253.6	203.8
Private households	-42.7	-26.7	193.2	183.8	-88.4	20.3	34.1	65.5	-73.1	-287.2	-166.5
Laundry cleaning and pressing	-6.7	-46.7	43.7	13.8	-9.3	-4.2	43.5	9.1	41.6	18.4	-10.1
Self-service laundries and dry cleaners	1.3	33.3	-20.4	-6.3	-2.3	7.2	-3.7	1.0	1.1	41.6	13.7
Funeral services	20.0	-6.7	1.0	-30.0	19.2	13.3	8.4	-3.8	10.0	-1.6	26.2
Miscellaneous personal services	36.0	-46.7	-15.5	17.5	88.2	3.1	29.9	33.5	30.2	91.2	50.5
Accommodation and food services	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Hotels and motels	31.7	19.4	25.0	26.7	16.5	18.3	25.2	26.6	32.9	21.4	21.0
Lodging houses and residential clubs	-5.7	-4.5	-5.0	-4.3	-3.1	-3.2	-4.0	-3.7	-0.5	-1.7	-2.8
Camping grounds and trailer parks	4.1	2.9	1.0	1.8	2.4	1.6	1.2	0.7	0.4	0.8	1.5
Restaurants, caterers, and taverns	69.9	82.2	79.0	75.8	84.2	83.3	77.6	76.3	67.1	79.5	80.3
Miscellaneous services	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Labour organizations and trade associations	6.0	3.4	3.5	5.7	10.8	6.6	6.8	4.9	5.2	8.8	7.7
Photographic services n.e.s.	3.7	6.7	3.8	7.0	6.7	8.4	11.1	7.2	6.2	8.4	7.4
Automobile and truck rental	2.1	3.4	4.4	1.9	3.0	6.4	3.7	3.4	4.4	6.0	4.7
Machinery and equipment rental	6.4	5.9	1.4	-6.0	3.1	3.6	1.8	2.9	8.2	7.9	4.3
Blacksmithing and welding shops	5.4	16.0	7.7	10.2	5.2	5.9	10.5	16.0	21.2	9.0	8.7
Miscellaneous repair shops	4.1	4.2	9.4	11.2	5.8	6.5	8.4	7.2	7.4	5.0	6.4
Services to buildings and dwellings	20.0	11.8	25.8	23.5	21.8	21.1	11.6	13.8	16.1	19.6	20.1
Miscellaneous services n.e.s.	52.3	48.7	43.9	46.4	43.7	41.6	46.1	44.7	31.3	35.3	40.7
Public administration and defence											
Federal administration	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Defence services	16.9	-101.5	663.7	-73.5	3.9	-27.2	-470.9	2,109.1	-181.6	-34.6	-30.6
Other federal administration	83.1	201.5	-563.7	173.5	96.1	127.2	570.9	-2,009.1	281.6	134.6	130.6
Provincial administration	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Local administration	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Other government services	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table C-2 (concl'd.)

	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Canada[1]
						(Per cent)					
Trade	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Wholesale trade	26.4	7.3	23.7	28.8	29.4	33.0	29.6	32.5	32.2	26.9	30.5
Retail trade	73.6	92.7	76.3	71.2	70.6	67.0	70.4	67.5	67.8	73.1	69.5
Finance, insurance, and real estate	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Finance industries	50.3	51.7	49.9	49.7	53.8	50.9	43.2	50.0	45.5	52.5	50.6
Insurance carriers	9.2	4.0	12.4	14.1	13.6	12.6	24.5	22.2	9.0	5.4	12.0
Insurance agencies and real estate	40.6	44.4	37.8	36.2	32.6	36.5	32.3	27.8	45.5	42.1	37.4
Transportation, communication, and other utilities	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Transportation	41.8	69.0	49.8	15.4	44.3	45.7	67.0	40.9	58.3	57.8	49.5
Storage	3.4	-4.6	3.9	2.9	0.9	2.4	1.7	7.5	2.7	2.5	2.3
Communication	42.0	24.7	35.8	43.2	39.7	32.5	15.6	35.0	25.2	28.6	32.2
Electric power, gas, and water utilities	12.8	10.9	10.5	38.5	15.2	19.3	15.7	16.6	13.8	11.1	16.1

1 Excludes Yukon and Northwest Territories.
SOURCE Based on data from Statistics Canada.

Appendix D

Appendix to Chapter 12

Table D-1

Estimated Coefficients for the Service Industries, 1971

	Constant	Size	Market	Education	Recreation centres	Location quotient	Average size	Regional dummy	$\bar{R}^2$
Wholesale									
All CAs + CMAs	48,396.5	5,430.9**	3,902.5*	7,995.8****	-4,508.1**	17,225.7*	-784.9	...	.29****
Eastern CAs + CMAs	35,995.3	3,836.4*	3,208.8	5,801.6***	-5,469.4***	6,709.7	1,214.0	...	.25****
Regional dummy	37,239.7	4,489.1**	3,753.6*	5,834.2***	-4,452.0*	2,610.2	1,475.3	27,492.7****	.41****
Retail									
All CAs + CMAs	19,715.6	702.6*	2,215.1****	-771.9*	-568.9	-4,459.9*	2,047.5****	...	.57****
Eastern CAs + CMAs	19,488.5	628.4	2,228.2****	-1,280.9***	-556.5	-6,241.6**	2,375.9****	...	.56****
Regional dummy	20,112.7	703.0*	2,222.1****	-792.1*	-599.5*	-4,757.3*	2,003.0****	871.1	.56****
Amusement and recreation									
All CAs + CMAs	9,778.2	297.2	404.9	944.1***	384.1	384.7	-132.9	...	.05
Eastern CAs + CMAs	10,297.2	388.1	656.4	1,080.3***	534.7	14.3	-188.6	...	.06*
Regional dummy	9,939.0	313.7	440.2	990.7***	411.0	361.8	-146.7	-589.8	.04
Personal services									
All CAs + CMAs	5,672.0	162.3**	491.3****	56.8	29.5	-259.9	262.1	...	.33****
Eastern CAs + CMAs	5,874.9	164.8**	467.7****	27.0	15.3	-909.6*	401.2**	...	.35****
Regional dummy	5,548.7	154.0**	467.4****	26.6	11.7	-252.8	288.4	380.5*	.34****
Accommodation and food services									
All CAs + CMAs	7,959.3	51.8	475.3****	100.3	89.4	-391.5	160.3**	...	.18****
Eastern CAs + CMAs	8,123.0	55.1	433.0***	141.6	47.4	-384.9	119.8	...	.10**
Regional dummy	8,078.9	56.4	478.2****	95.0	87.7	-466.3	147.6*	208.6	.18****
Services to business management									
All CAs + CMAs	9,915.9	592.2*	-62.0	100.8	-202.4	1,407.3	279.5**	...	.23****
Eastern CAs + CMAs	10,288.1	610.6*	105.8	71.1	-203.8	1,136.2	246.8	...	.18***
Regional dummy	10,061.8	604.0*	-34.6	136.0	-189.6	1,411.0	262.7*	-443.5	.23****

NOTE Four asterisks denote significance at .001 per cent; three, at .01 per cent; two, at .05 per cent; and one, at .10 per cent.
SOURCE Estimates by Economic Council of Canada.

Table D-2

Estimated Coefficients for the Manufacturing Industries, 1971 and 1981

		Constant	Size	Market	Education	Recreation centres	Location quotient	Average size	Regional dummy	$\bar{R}^2$
Wood Industries										
1971	All CAs + CMAs	7.87	.75**	...	.003	-.05	-.96	.07	...	.23*
	Eastern CAs + CMAs	7.71	.71*	-.20	...	-.19	-.97	.06	...	.20
	Regional factor	7.80	.65*	...	-.14	-.05	-.93	.06	1.01	.23*
1981	All CAs + CMAs	17.34	.97	.35	-.64	...	1.62	.21***	...	.39***
	Eastern CAs + CMAs	16.33	.76	.17	-.92	...	1.73	.22***	...	.33**
	Regional factor	16.99	.78	-.43	-.69	...	1.46	.20***	3.28	.39***
Furniture and fixtures										
1981	All CAs + CMAs	14.25	.53	.58	...	-1.84	-.84	.28*	...	.26*
	Eastern CAs + CMAs	12.97	.34	1.06	-1.14	...	-1.11	.33**	...	.28
	Regional factor	13.06	.58	-.86	...	-1.78	-.97	.29*	4.61	.30**
Printing and publishing										
1971	All CAs + CMAs	14.50	1.01*	2.41****	-.01	...	-3.32*	.01	...	.49****
	Eastern CAs + CMAs	14.90	.90	2.70****	.95*	...	-3.20	-.02	...	.48***
	Regional factor	14.88	.95*	2.53****	.26	...	-3.00*	-.01	-1.01	.48***
1981	All CAs + CMAs	23.00	.95	3.09****	...	-.27	2.61	.04	...	.35****
	Eastern CAs + CMAs	22.40	1.21	2.03**	2.21**	...	2.43	.04	...	.33***
	Regional factor	23.74	1.06	3.72****	...	-.21	2.72	.02	-2.61	.35***
Metal fabricating										
1971	All CAs + CMAs	11.95	.44	.83**	-.34	...	.82	-.004	...	.32**
	Eastern CAs + CMAs	12.16	.50	1.17**	-.72*	...	46	-.002	...	.44***
	Regional factor	11.71	.42	.75**	-.62	...	.81	-.002	1.16	.33**
Nonmetallic mineral products										
1971	All CAs + CMAs	12.92	-.20	2.19**	2.05*	...	-2.39	.16	...	.33**
	Eastern CAs + CMAs	11.67	.35	1.30	1.18	...	-1.42	.12	...	.35*
	Regional factor	12.03	.05	1.36*	.21	...	-2.77	.16*	7.07*	.60***
1981	Regional factor	38.80	1.12	-.65	.02	...	-3.24	.02	15.53***	.24*

NOTE Four asterisks denote significance at .001 per cent; three, at .01 per cent; two, at .05 per cent; and one, at .10 per cent.
SOURCE Estimates by Economic Council of Canada.

Appendix E

Appendix to Chapter 13

Manufacturing and Employment Instability

The main purpose of this Appendix is to provide and explain a series of tables illustrating the potential role that manufacturing can play in promoting greater provincial employment stability in western Canada. We are particularly concerned with putting manufacturing in the context of the provincial economies as a whole rather than in isolation. It is also important to compare the situations of the four western provinces and, to some extent, contrast their circumstances with those of the two central provinces of Canada – Quebec and Ontario. This Appendix, however, will not get involved in methodological discussion; readers interested in technical details are referred to a forthcoming technical document prepared for the Economic Council by H. Postner and L. Wesa, "Industrial Diversification in Western Canada: A Portfolio Analysis of the Manufacturing Sectors."

Table E-1 shows an index of employment instability over two separate, medium-term time periods, 1966-74 and 1975-83. The index is exhibited for each of the western provinces and also for Quebec and Ontario. The construction of the index is standardized so that full comparability both over time and across provinces is permissible. The absolute value of the index, when multiplied by 100, indicates roughly the typical overall percentage (absolute) deviation of provincial monthly employment fluctuations (around trend) *relative* to the typical overall level of employment. It is evident from Table E-1 that the western provinces are not always more unstable than the central provinces in terms of employment fluctuations. One possible objection to these results is that the two time periods are not long enough to measure structural instability.[1] Another objection is that the underlying data base does not permit satisfactory industrial disaggregation, particularly with respect to manufacturing. In order to overcome both of these objections, we turn to an alternative set of measurements.

Table E-2 provides the same (methodological) index of provincial employment instability; however, the data cover a longer, single time period, 1970-83, and are based on what is known as the larger-firm survey. The employment coverage of this survey is not universal: it excludes agriculture; fishing, hunting and trapping; and public administration. There is only fair coverage of noncommercial services. There is, however, excellent coverage of forestry; mining; manufacturing; transportation, communication, and other utilities; and finance, insurance, and real estate. The coverage of construction and of trade is generally satisfactory. Most important, for our purposes, the survey permits a disaggregated analysis of the manufacturing sector, and the numbers do not contain "rounding errors."[2] It should, nevertheless, be borne in mind that Table E-2 does not cover all provincial employment, as was implicitly the case for the instability measures examined in Chapter 2 but rather employment essentially in the nonagricultural incorporated business sector. The table clearly shows that in this part of the economy over the longer time period 1970-83 each of the western provinces was definitely more unstable than Ontario. The largest "gap" was between Alberta and Ontario.[3] Thus there is scope in this sector for improvement in comparison with Ontario and, to a lesser extent, Quebec. These relationships continue to hold whether the index is calculated on a purely monthly basis or using two-month averages (i.e., six observations per year). In

Table E-1

Index of Provincial Employment Instability, Labour Force Survey, Central and Western Canada, 1966-83

	1966-74	1975-83
Central Canada		
Quebec	.0355	.0384
Ontario	.0252	.0296
Western Canada		
Manitoba	.0343	.0299
Saskatchewan	.0501	.0382
Alberta	.0330	.0320
British Columbia	.0299	.0360

SOURCE H. H. Postner and L. Wesa, "Industrial Diversification in Western Canada: A Portfolio Analysis of the Manufacturing Sector," Economic Council of Canada (forthcoming).

Table E-2

Index of Provincial Employment Instability, Central and Western Canada, 1970-83

	Monthly data	Two-month averages
Central Canada		
Quebec	.0334	.0328
Ontario	.0292	.0288
Western Canada		
Manitoba	.0344	.0337
Saskatchewan	.0419	.0410
Alberta	.0542	.0541
British Columbia	.0429	.0416

SOURCE H. H. Postner and L. Wesa, "Industrial Diversification in Western Canada: A Portfolio Analysis of the Manufacturing Sector," Economic Council of Canada (forthcoming).

order to abstract from strictly random and seasonal influences (very short-term), the remaining tables in this Appendix are based on two-month averages. Nevertheless, we think that the time period 1970-83 is sufficiently long to embody medium-term and other structural employment fluctuations, as well as short-term variations.

We are not restricted to only the provincial summary indexes of employment instability shown in Appendix Table E-2. Tables E-3, E-4, E-5, and E-6 provide some ideas, but still not the complete story, concerning the ultimate sectoral component sources of the instability measures. For each western province we show the sectoral employment weights (relative importance)[4] and the own-sectoral indexes of employment instability over the long-term period 1970-83. It is now evident that the analysis contains eight distinct industrial sectors (covering employment in the nonagricultural incorporated business sector), one of which is of special interest – manufacturing. The sectoral employment weights merely show the percentage distribution of total employment over the eight business sectors. It is easily verified that manufacturing employment is considerably more important, relatively speaking, in Manitoba and British Columbia, compared with Saskatchewan and Alberta.[5] The four tables also include sectoral instability indexes. Each particular sectoral index indicates what the "overall" provincial employment instability index would be *if* provincial employment were all concentrated in one particular sector.

Table E-3

Sectoral Employment Weights and Instability Indexes, Manitoba, 1970-83

	Weight	Index
	(Per cent)	
Forestry	0.5	.209
Mining	3.4	.072
Manufacturing	25.4	.037
Construction	4.2	.134
Transportation, communication, and other utilities	23.5	.045
Trade	22.9	.043
Finance, insurance, and real estate	7.3	.043
Commercial services	12.8	.044

SOURCE H. H. Postner and L. Wesa, "Industrial Diversification in Western Canada: A Portfolio Analysis of the Manufacturing Sector," Economic Council of Canada (forthcoming).

Table E-4

Sectoral Employment Weights and Instability Indexes, Saskatchewan, 1970-83

	Weight	Index
	(Per cent)	
Forestry	0.6	.208
Mining	6.4	.089
Manufacturing	15.1	.048
Construction	5.6	.186
Transportation, communication, and other utilities	24.7	.045
Trade	26.4	.035
Finance, insurance, and real estate	8.8	.041
Commercial services	12.4	.053

SOURCE H. H. Postner and L. Wesa, "Industrial Diversification in Western Canada: A Portfolio Analysis of the Manufacturing Sector," Economic Council of Canada (forthcoming).

Table E-5

Sectoral Employment Weights and Instability Indexes, Alberta, 1970-83

	Weight	Index
	(Per cent)	
Forestry	0.5	.178
Mining	10.0	.099
Manufacturing	16.6	.051
Construction	8.9	.142
Transportation, communication, and other utilities	18.1	.039
Trade	22.4	.045
Finance, insurance, and real estate	7.6	.049
Commercial services	15.9	.065

SOURCE H. H. Postner and L. Wesa, "Industrial Diversification in Western Canada: A Portfolio Analysis of the Manufacturing Sector," Economic Council of Canada (forthcoming).

In reality, of course, the summary provincial indexes of Table E-2 reflect each and every relevant sectoral instability index in Tables E-3 to E-6, the reflection being roughly according to weight. Indeed, when provincial business employment is distributed over the sectors, the distribution itself helps to "lower" the overall provincial instability index *provided* that the individual sectoral instability patterns are not strongly correlated (in other words, the superimposing effect mentioned in the text of this chapter must be at least partly absent). This is what economic diversification for the reduction of instabil-

Table E-6

Sectoral Employment Weights and Instability Indexes, British Columbia, 1970-83

	Weight	Index
	(Per cent)	
Forestry	3.5	.137
Mining	3.0	.078
Manufacturing	28.5	.063
Construction	4.7	.136
Transportation, communication and other utilities	19.9	.039
Trade	19.2	.020
Finance, insurance, and real estate	7.6	.032
Commercial services	13.5	.051

SOURCE H. H. Postner and L. Wesa, "Industrial Diversification in Western Canada: A Portfolio Analysis of the Manufacturing Sector," Economic Council of Canada (forthcoming).

ity is all about, and so each western province is already benefiting from diversification in terms of greater employment stability than otherwise. Consider, for example, Manitoba. The summary index of provincial employment instability from Table E-2 – namely, 0.0337 – is smaller than that of each and every sectoral component in Table E-3.

The main focus of Chapter 13 and this Appendix is on the manufacturing sector. How does the instability index of manufacturing compare with the indexes of other sectors? If the instability index of that sector is, indeed, significantly lower, then a case can be made for "pushing" employment in manufacturing relative to other sectors. This would hold true provided that cross-sectoral instability effects were small or approximately invariant with respect to the sectors concerned. Upon examining the results in Tables E-3 to E-6, the following general statements can be made: 1) the instability index of manufacturing is always *lower* than that of forestry; mining; construction; and agriculture (the latter is evident from additional results); 2) the instability index of manufacturing is usually *higher* than that of trade and of finance, insurance, and real estate (and also public administration, according to other evidence). The instability index of transportation, communication, and other utilities is also usually lower than that of manufacturing. The comparative situation with respect to commercial services varies with the individual province. Thus there appears to be a good case, from the stability point of view, for promoting manufacturing at the "expense" of the natural resource sectors and closely related construction, but certainly not relative to some important service-type sectors of the provincial economies.

Tables E-3 to E-6 account roughly for the individual own-sectoral contributions to the provincial instability measures of the original Table E-2. We know, however, that cross-sectoral instability effects could also be important (this was mentioned in the text of Chapter 13). Next, Table E-7 provides a summary guide to the relative importance of the two main types of instability effects. Clearly, the cross-sectoral instability component is by far the more important in all western provinces.[6] This means that fluctuations in the employment pattern around long-term growth trends tend to be positively correlated across different sectors in each of the four western provinces (and also in Quebec and Ontario). Such positive correlation is a symptom of strong industrial interdependence (intermediate demand) and commodity-consumption complementarities (final demand). The cross-sectoral instability effects also reflect the "common" provincewide cyclical impacts on industrial employment behaviour. One lesson to be learned from Table E-7 is that when considering a projected change in provincial employment distribution (e.g., a "shift" towards more manufacturing in Alberta), one must take into account cross-sectoral instability effects, as well as the more obvious own-sectoral employment fluctuations around the estimated growth trends.

Table E-7

Contribution of Own-Sectoral and Cross-Sectoral Instability to Summary Measure of Provincial Employment Instability, Western Provinces, Canada, 1970-83

	Employment instability	
	Own-sectoral	Cross-sectoral
	(Per cent)	
Manitoba	33.7	66.3
Saskatchewan	27.3	72.7
Alberta	20.6	79.4
British Columbia	34.2	65.8

SOURCE H. H. Postner and L. Wesa, "Industrial Diversification in Western Canada: A Portfolio Analysis of the Manufacturing Sector," Economic Council of Canada (forthcoming).

Considering manufacturing as a whole, however, is a very crude way of achieving successful economic

diversification. Let us now look therefore at employment distribution and instability *within* the manufacturing sector for each western province.[7] Tables E-8 and E-9 show the situation in Manitoba and Alberta, respectively (similar tables are also available for Saskatchewan and British Columbia). Industries 1 and 2 – namely, food and beverages; and printing and publishing – can be called "local" manufacturing because most of the industries' outputs are typically consumed within the respective provinces.[8] Industries 3 and 6 (as well as 7 in Table E-9) are classified as primary manufacturing; industries 7 to 13 (or 8 to 14 in Table E-9), as secondary manufacturing. Residual manufacturing, then, includes tobacco products; rubber and plastic products; leather products; textiles; knitting mills; and miscellaneous manufacturing (and also petroleum and coal products for Manitoba) – all of which are too "small" to be distinguished in our analysis. The tables show the relative (percentage) employment weights for each of the numbered manufacturing industries. The summation of the weights is given in the last line of the tables – total manufacturing – and is identical to the manufacturing sector's employment weight, already shown in Tables E-3 and E-5. Note that two secondary manufacturing industries stand out in Manitoba – clothing; and transportation equipment – and these are the subject of a special survey discussed in Chapter 13. No one industry, aside from the "local" food and beverage industry, dominates the scene within Alberta manufacturing. Even the petroleum and coal industry does not receive a relatively large employment weight.

Table E-8

Employment Weights and Instability Indexes for the Manufacturing Industry, Manitoba, 1970-83

	Weight	Index
	(Per cent)	
Food and beverages	5.1	.039
Printing and publishing	1.9	.050
Wood products	0.8	.090
Paper and allied industries	1.1	.039
Primary metals	1.4	.083
Nonmetallic mineral products	0.6	.119
Clothing	3.4	.053
Furniture and fixtures	0.8	.088
Metal fabricating	2.2	.077
Machinery	2.1	.129
Transportation equipment	2.8	.092
Electrical products	1.0	.044
Chemical products	0.5	.073
Residual manufacturing	1.6	.039
Total manufacturing	25.4	.037

SOURCE H. H. Postner and L. Wesa, "Industrial Diversification in Western Canada: A Portfolio Analysis of the Manufacturing Sector," Economic Council of Canada (forthcoming).

Table E-9

Employment Weights and Instability Indexes for the Manufacturing Industry, Alberta, 1970-83

	Weight	Index
	(Per cent)	
Food and beverages	4.1	.046
Printing and publishing	1.0	.060
Wood products	1.4	.075
Paper and allied industries	0.6	.075
Primary metals	1.0	.097
Nonmetallic mineral products	1.3	.101
Petroleum and coal products	0.7	.154
Clothing	0.6	.056
Furniture and fixtures	0.3	.124
Metal fabricating	1.6	.083
Machinery	0.8	.143
Transportation equipment	1.0	.101
Electrical products	0.4	.083
Chemical products	1.0	.059
Residual manufacturing	0.7	.074
Total manufacturing	16.6	.051

SOURCE H. H. Postner and L. Wesa, "Industrial Diversification in Western Canada: A Portfolio Analysis of the Manufacturing Sector," Economic Council of Canada (forthcoming).

Tables E-8 and E-9 also show employment instability indexes for each of the distinguished industries. The methodology underlying the calculations is identical to that explained earlier. There are some wide variations in individual employment instabilities (actually own-industry instability indexes) within each province's manufacturing sector. Even the "same" industry can take on varying degrees of instability across provinces (e.g., paper and allied industries; and electrical products). But there are also industries with somewhat similar own-instability properties across the two provinces (e.g., food and beverages; clothing; metal fabricating; and machinery). Again, the last line of the tables repeats the employment instability index for the manufacturing sector as a whole. Most revealing is the fact that the employment instability of total manufacturing is typically *lower* than that of all the component manufacturing industries, especially in the case of Manitoba. Thus economic diversification within the manufacturing sector is responsible for "lowering" employment instability, measured at the total sectoral level. There are

significant cross-industry instability relations between the component manufacturing industries, and these have some superimposing impact on the total employment instability index; but the interrelations are not perfect (in other words, there is a less-than-perfect positive correlation), so there results a *net* cancellation effect. This latter phenomenon was previously called economic diversification.

With this background we are now prepared to tackle some key policy-oriented exercises. Given the economic structural situation in the western provinces, we might ask whether all the "opportunities" for successful diversification have been exploited? More precisely, we take, as given, the calculated matrices of all own-industry and cross-industry instability indexes as they already exist.[9] Then economic diversification and its impact on provincewide employment instability would depend on the *distribution* of employment over the various sectors and individual manufacturing industries. If the status-quo distribution is merely maintained, then the "resulting" instability indexes would coincide with those already shown in Table E-2. In order to lower provincial employment instability, however, we must consider the possibility of marginally altering the status-quo employment distribution pattern. The alterations must be "marginal" since it is not realistic to consider drastic changes in provincial employment distribution, even over the long term. On the other hand, we should seek to *minimize* provincial employment instability (or, equivalently, *maximize* provincial economic diversification) *subject to* reasonable marginal limitations on employment distribution change. The remaining tables in this Appendix describe the impact of two such basic exercises ("Case 1" and "Case 2") for Manitoba and Alberta. It should be noted that in these constrained optimization exercises, there are seven distinct nonmanufacturing sectors and, at the same time, the manufacturing sector itself is disaggregated into 14 or 15 component industries, depending upon the province. Thus manufacturing is analysed in the context of the respective provincial economies and is not considered in isolation.[10]

Tables E-10 and E-11 show the results for Manitoba. They are intended strictly as illustrations of some of the outer limits that might be possible if sufficiently powerful policy instruments were available. In practice, considerably less than this is probably achievable. In Case 1, the rules of the game are as follows: each nonmanufacturing sector and manufacturing industry is permitted to increase its relative employment weight by 25 per cent at the most; at the same time, no sector or industry is permitted to decrease its employment weight by more than 25 per cent. In effect, this means that the "upper bounds" on employment distribution equal 1.25 multiplied by the sectoral employment weights of Table E-3 and the industry employment weights of Table E-8; the "lower bounds" on employment distribution equal 0.75 multiplied by the same employment weights. Then the provincewide employment instability measure is minimized with respect to employment distribution subject to the Case 1 rules of the game *and* subject to the employment distribution identity that all relative employment weights must sum to 100 per cent. It is easy to observe the impact of this procedure by merely comparing the percentages in the Case 1 column of Tables E-10 and E-11 with the corresponding percentages in Tables E-3 and E-8.[11] Clearly, the losers are mining; construction; transportation, communication, and other utilities; and commercial services in terms of relative employment weight. The "winners" are manufacturing (as a whole); trade; and finance. Within manufacturing, some significant "losers" are: primary metals; metal fabricating; machinery, and transportation equipment. Some significant "winners" are: food and beverages; printing and publishing; clothing; and electrical products. It is *most* interesting to observe that the manufacturing sector turns out to gain from provincewide employment redistribution for Manitoba, even though Case 1 is essentially neutral in this respect.

Table E-10

Sectoral Employment Weights after Constrained Optimization to Minimize Provincial Employment Instability, Two Basic Cases,[1] Manitoba

	Case 1	Case 2
	(Per cent)	
Forestry	0.5	0.5
Mining	2.5	2.5
Manufacturing	26.4	29.1
Construction	3.2	3.2
Transportation, communication and other utilities	20.1	23.5
Trade	28.6	22.9
Finance, insurance, and real estate	9.1	7.3
Commercial services	9.6	11.0

1 In Case 1, each nonmanufacturing sector and manufacturing industry is permitted to increase its relative employment weight by a maximum of 25 per cent and is not allowed to decrease it by more than that amount; in Case 2, each nonmanufacturing sector is permitted to decrease its employment weight by no more than the factor 0.75 and is allowed no increase whatsoever.

SOURCE H. H. Postner and L. Wesa, "Industrial Diversification in Western Canada: A Portfolio Analysis of the Manufacturing Sector," Economic Council of Canada (forthcoming).

Table E-11

Manufacturing Employment Weights after Constrained Optimization to Minimize Provincial Employment Instability, Two Basic Cases,[1] Manitoba

	Case 1	Case 2
	(Per cent)	
Food and beverages	6.4	6.4
Printing and publishing	2.4	2.4
Wood products	0.6	0.8
Paper and allied industries	1.5	1.5
Primary metals	1.0	1.4
Nonmetallic mineral products	0.5	0.6
Clothing	4.2	4.2
Furniture and fixtures	0.6	0.8
Metal fabricating	1.7	2.2
Machinery	1.6	2.1
Transportation equipment	2.1	2.8
Electrical products	1.3	1.3
Chemical products	0.6	0.6
Residual manufacturing	2.0	2.0
Total manufacturing	26.4	29.1

1 In Case 1, each nonmanufacturing sector and manufacturing industry is permitted to increase its relative employment weight by a maximum of 25 per cent and is not allowed to decrease it by more than that amount; in Case 2, each nonmanufacturing sector is permitted to decrease its employment weight by no more than the factor 0.75 and is allowed no increase whatsoever.

SOURCE H. H. Postner and L. Wesa, "Industrial Diversification in Western Canada: A Portfolio Analysis of the Manufacturing Sector," Economic Council of Canada (forthcoming).

Case 2 is similar to Case 1, except that there is a distinct bias favouring manufacturing. Here, the rules of the game are: each nonmanufacturing sector is permitted to decrease its employment weight by no more than the factor 0.75, while the same sectors are not permitted any increase whatsoever in relative employment weight (thus the "upper bound" factor equals 1.0). The manufacturing industries are permitted to increase relative employment weight by 25 per cent, but any decrease in employment weight is disallowed. Clearly, then, any employment distribution changes for nonmanufacturing must be "losses," while any such redistribution with respect to manufacturing must be "gains." Case 2 embodies an implicit policy orientation that favors manufacturing; but, and this is very important, any relative employment gains for manufacturing are "earned" in the sense that they must result in a decrease in provincial employment instability. The results in Tables E-10 and E-11 show a significant rise in Manitoba's manufacturing sector, from 25.4 per cent of total employment (Table E-3) to 29.1 per cent of total employment (Table E-10). These gains in relative employment are made at the expense of mining; construction; and commercial services (and not that of transportation, as in Case 1 – illustrating the implicit importance of cross-sectoral effects).[12] Within manufacturing, the "winners" are the same as in Case 1; and, of course, there are no "losers."

Tables E-12 and E-13 show the results of constrained optimization to minimize provincial employment instability for Alberta. These derived sectoral and industrial employment weights should be compared with the status-quo employment distributions in Tables E-5 and E-9. We will not tediously repeat an exposition for Alberta; the reader who has followed the story for Manitoba can easily pick up the major shifts in employment distribution. Briefly, it is evident that the *rationale* for promoting manufacturing in Alberta so as to lower provincial employment instability is considerbly weaker than in Manitoba (this is evident from Case 1). Nevertheless, it is possible to obtain significant employment gains for manufacturing in Alberta by deliberately favouring that sector (as in Case 2). Again, it is very important to note that the relative employment growth of the manufacturing sector is actually "earned" (in the sense defined in the preceding paragraph).

Table E-12

Sectoral Employment Weights after Constrained Optimization to Minimize Provincial Employment Instability, Two Basic Cases,[1] Alberta

	Case 1	Case 2
	(Per cent)	
Forestry	0.5	0.5
Mining	7.5	8.8
Manufacturing	16.4	20.0
Construction	6.7	6.7
Transportation, communication, and other utilities	22.6	18.1
Trade	28.0	22.4
Finance, insurance, and real estate	6.4	7.6
Commercial services	11.9	15.9

1 In Case 1, each nonmanufacturing sector and manufacturing industry is permitted to increase its relative employment weight by a maximum of 25 per cent and is not allowed to decrease it by more than that amount; in Case 2, each nonmanufacturing sector is permitted to decrease its employment weight by no more than the factor 0.75 and is allowed no increase whatsoever.

SOURCE H. H. Postner and L. Wesa, "Industrial Diversification in Western Canada: A Portfolio Analysis of the Manufacturing Sector," Economic Council of Canada (forthcoming).

Table E-13

Manufacturing Industry Employment Weights after Constrained Optimization to Minimize Provincial Employment Instability, Two Basic Cases,[1] Alberta

	Case 1	Case 2
	(Per cent)	
Food and beverages	5.2	5.2
Printing and publishing	0.8	1.3
Wood products	1.7	1.7
Paper and allied industries	0.8	0.8
Primary metals	0.8	1.3
Nonmetallic mineral products	0.9	1.3
Petroleum and coal products	0.5	0.7
Clothing	0.7	0.7
Furniture and fixtures	0.3	0.3
Metal fabricating	1.2	2.0
Machinery	0.6	0.8
Transportation equipment	0.7	1.2
Electrical products	0.5	0.5
Chemical products	0.8	1.3
Residual manufacturing	0.9	0.9
Total manufacturing	16.4	20.0

1 In Case 1, each nonmanufacturing sector and manufacturing industry is permitted to increase its relative employment weight by a maximum of 25 per cent and is not allowed to decrease it by more than that amount; in Case 2, each nonmanufacturing sector is permitted to decrease its employment weight by no more than the factor 0.75 and is allowed no increase whatsoever.

SOURCE H. H. Postner and L. Wesa, "Industrial Diversification in Western Canada: A Portfolio Analysis of the Manufacturing Sector," Economic Council of Canada (forthcoming).

So far we have not specifically stated the impact of constrained optimization on the respective provincial employment measures of instability.[13] Such a statement can now be found in Table E-14 (Manitoba) and Table E-15 (Alberta). These indexes of employment instability after constrained optimization should be compared with the status-quo instability measures of the original Table E-2. For example, as a result of Manitoba's Case 1, the index is lowered from .0337 to .0308, which is now close to that of Ontario. Case 2, which favours manufacturing, implictly embodies a more constrained situation and so must always result in a provincial instability measure that is greater than that of Case 1 – this is the implicit cost of favouring manufacturing. For Alberta, the two optimization exercises result in a lowering of the employment instability index from .0542 to .0490 and .0518, respectively. The gains in terms of potentially greater employment stability are not really spectacular but are still significant (see further discussion later). Even these rather modest gains *may* be lost, however, if the optimization exercises are subject to additional constraints. Suppose, for example, that while we want to minimize employment instability (around long-term growth trends), it is *also* desired to at least maintain provincewide long-term employment growth opportunities. Then there may result a conflict between the two goals if those particular industries which turn out to be stability-promoting happen also to possess relatively low long-term growth rates.[14]

Table E-14

Index of Provincial Employment Instability after Constrained Optimization to Minimize Instability, Two Basic Cases and Subcases,[1] Manitoba

	Case 1	Case 2
No additional constraints	.0308	.0321
Employment growth constraint	.0308	.0321
Average earnings constraint	–	.0323
Employment growth and average earnings constraint	–	.0324

1 In Case 1, each nonmanufacturing sector and manufacturing industry is permitted to increase its relative employment weight by a maximum of 25 per cent and is not allowed to decrease it by more than that amount; in Case 2, each nonmanufacturing sector is permitted to decrease its employment weight by no more than the factor 0.75 and is allowed no increase whatsoever.

SOURCE H. H. Postner and L. Wesa, "Industrial Diversification in Western Canada: A Portfolio Analysis of the Manufacturing Sector," Economic Council of Canada (forthcoming).

Does this potential conflict exist in the real world of the western provinces and, if so, how serious is its impact? There is no need to speculate on these matters since the required calculations have already been done. It turns out that for Manitoba there is no conflict. The introduction of an additional employment growth constraint, guaranteeing at least the maintenance of observed (1970-83) provincewide long-term employment growth, is simply not binding! This means essentially that the additional constraint condition is already satisfied by the original optimization solution without its formal imposition. For Alberta, the additional constraint is binding; and this, in effect, makes it more difficult to obtain gains in terms of greater provincial employment stability (see Table E-15, line 2). But such gains are still possible – we can always do better than the status quo!

A very similar story can be told with respect to another desired goal: the maintenance of provincial average wage and salary levels. Here a potential conflict would seem to be apparent, since one might expect stability-promoting industries to possess relatively low wage and salary rates (see the discus-

Table E-15

Index of Provincial Employment Instability after Constrained Optimization to Minimize Instability, Two Basic Cases and Subcases,[1] Alberta

	Case 1	Case 2
No additional constraints	.0490	.0518
Employment growth constraint	.0501	.0531
Average earnings constraint	–	.0520
Employment growth and average earnings constraint	–	.0534

1 In Case 1, each nonmanufacturing sector and manufacturing industry is permitted to increase its relative employment weight by a maximum of 25 per cent and is not allowed to decrease it by more than that amount; in Case 2, each nonmanufacturing sector is permitted to decrease its employment weight by no more than the factor 0.75 and is allowed no increase whatsoever.

SOURCE H. H. Postner and L. Wesa, "Industrial Diversification in Western Canada: A Portfolio Analysis of the Manufacturing Sector," Economic Council of Canada (forthcoming).

sion of this potential conflict in Chapter 13). Once again, however, this is strictly an empirical matter and need no longer be the subject of speculation. It turns out that for both Manitoba and Alberta an additional average earnings constraint *is* binding but trivially so.[15] The impact of the additional constraint on provincial employment instability is shown for Case 2 in Tables E-14 and E-15 (line 3). Indeed, we have even worked out the optimization exercises when *both* of the additional constraints are present (line 4).[16] It is evident, though, that further constraints can make employment stability gains more difficult (though not impossible), thus some concluding comments are called for.[17]

First, what effect do these additional constraints have on the proposed employment redistribution? Are specific manufacturing industries still the same "winners" and "losers" in the face of additional goal constraints? These questions have been answered by our computer program that handles the optimization exercises. It turns out that in the face of some additional constraints, almost all manufacturing "winners" and "losers" are preserved; the constraints mostly affect the nonmanufacturing sectors and even those to limited extent. In other words, the *qualitative* (if not the quantitative) directions for employment redistribution are maintained. But how can even greater gains in terms of employment stability for the western provinces be achieved, either with or without additional goal constraints? This question is not strictly academic since we know that the western provinces do not compare favourably with Ontario in this regard (see, again, Table E-2). One way is to introduce entirely *new* industries with appropriate stability-promoting properties. Table E-16 shows the impact of a new, "perfectly stable" industry constrained to represent no more than 2.5 per cent of employment in Manitoba and Alberta (the context here is otherwise Case 2). Another approach would be to loosen the "upper bound" constraints on some existing manufacturing industries that are already known to be "winners" (good candidates would be clothing in Manitoba and electrical products in Alberta).[18] Finally, it is of utmost importance to note that constrained optimization to minimize employment instability is best performed at as fine a level of industrial disaggregation as possible.[19] The 14 or 15 manufacturing industries distinguished in this analysis are only a beginning. There is a need for greater *discrimination*, and this will pay off in even greater employment stability without sacrificing other desirable goals such as provincewide employment growth opportunities and average returns to employment.

Table E-16

Index of Provincial Employment Instability after Constrained Optimization to Minimize Instability, with and without the Impact of an Additional Perfectly Stable Industry (Case 2)[1]

	Manitoba	Alberta
With a stable industry	.0312	.0498
Without a stable industry	.0321	.0518

1 In Case 1, each nonmanufacturing sector and manufacturing industry is permitted to increase its relative employment weight by a maximum of 25 per cent and is not allowed to decrease it by more than that amount; in Case 2, each nonmanufacturing sector is permitted to decrease its employment weight by no more than the factor 0.75 and is allowed no increase whatsoever.

SOURCE H. H. Postner and L. Wesa, "Industrial Diversification in Western Canada: A Portfolio Analysis of the Manufacturing Sector," Economic Council of Canada (forthcoming).

Notes

CHAPTER 2

1 D. Owram, "The Economic Development of Western Canada: An Historical Overview," Economic Council of Canada Discussion Paper 219, November 1982, p. 56.

2 Bernard R. Blishen and Hugh A. McRoberts, "Revised Socioeconomic Index for Occupations in Canada," *Canadian Review of Sociology and Anthropology* 13 (February 1976):71-79.

CHAPTER 3

1 Economic Council of Canada, *Looking Outward: A New Trade Strategy for Canada* (Ottawa: Information Canada, 1975).

2 For an excellent, brief discussion of this concept, see G. R. Peeling, "Counter Trade," in the *International Mineral Scene*, The Mining Association of Canada, February 1984, pp. 19-21.

CHAPTER 4

1 The growth and retrenchment view is implicit in the work of many Canadian economists and economic historians. They have typically stressed the role of resources, especially resource exports, in Canadian development. H. Innis, W. A. Mackintosh, O. North and T. Esterbrook are four of the best known. No such well-defined group of writers can be distinguished, however, embodying in their work all or most of the elements making up the growth and evolution view. Rather, this view is a logical consequence of, and therefore implicit in, the application of several elements of modern economic thinking to the problems of regional development. As such it constitutes, in our view, what it is fashionable these days to label a "paradigm" of regional development. Each of the elements has a voluminous literature of its own. Some key writings that underlie the paradigm are those on: the influence of size of the market on efficiency through specialization and scale, ranging all the way from Adam Smith to modern works on the merits of customs unions; the notions of infant industries and learning by doing, from Liszt to Arrow; and the concept of agglomeration economies in both nonmarket and market industries, treated in detail in Chapter 12 below.

2 For those who are sceptical, a formal, mathematical treatment of a simplified economy in which either outcome is possible, depending on the size of certain key parameters, has been developed. See N. M. Swan, "Double Regional Equilibria and Their Significance for Western Canada," Economic Council of Canada (forthcoming).

CHAPTER 5

1 In preparing this chapter, we have drawn extensively upon the following works: P. H. Pearse, Chairman, *Timber Rights and Forest Policy in British Columbia*, Report of the Royal Commission on Forest Resources, vols. 1 and 2 (Victoria: Queen's Printer, 1976); L. Copithorne, *Natural Resources and Regional Disparities*, Economic Council of Canada (Ottawa: Supply and Services Canada, 1979); P. H. Pearse, *The Forest Industries of British Columbia*, B.C. Tel Series in Business Economics, No. 1 (Vancouver: British Columbia Telephone Company, 1980); Province of British Columbia, Ministry of Forests, *Forest and Range Resource Analysis Technical Report*, vols. 1 and 2 (Victoria: Ministry of Forests, 1980); M. B. Percy, "The Forest Industry and Its Contribution to the Economy of British Columbia," a paper prepared for the Economic Council of Canada, 1984; and T. Heaps, "The Sensitivity of the Present Value of Stumpage under Alternative Criteria for Harvesting," a paper prepared for the Economic Council of Canada, 1984.

2 Basic silviculture or forest management encompasses expenditures on forest protection across regions to a common standard, on site preparation after logging, and on artificial regeneration when natural reforestation is unlikely to occur or fails to take place within a reasonable time.

3 See, in particular, F.L.C. Reed and Associates, *Forest Management in Canada* (Toronto: Forest Management Institute, 1978); and "Recent Reductions in the Canadian Timber Base," Appendix IV of *The Forest Imperative*, Proceedings of the Canadian Forest Congress, 1980. These studies suggested that Canada faces a potentially bleak timber supply future. The 1978 study forecast increasing timber deficits for the Atlantic region as a whole and local shortfalls in other provinces, and it compared most unfavourably the level of investment in forest management practices in Canada with the levels achieved in the United States and Scandinavia. The 1980 study was highly pessimistic about the potential for the expansion of timber harvests in most provinces, especially British Columbia. A federal discussion paper – "A Forest Sector Strategy for Canada," Ottawa, September 30, 1981 – echoed the pessimistic tone of the Reed and Associates studies and further emphasized the need for investments in the forest base to improve its physical productivity. In a policy statement, the Science Council of Canada ("Canada's Threatened Forests," Ottawa, 1983) expressed similar concerns and advocated greater expenditures on reforestation and intensive forest management practices.

4 B.C. Ministry of Forests, *Forest and Range Resource Analysis Technical Report.*

5 Statistics Canada, *Canadian Forestry Statistics*, Cat. 25-202, 1980 and 1981.

6 D. M. Adams, R. W. Haynes, G. F. Dutrow, R. L. Barber, and J. M. Vasievich, "Private Investment in Forest Management and the Long-Term Supply of Timber," *American Journal of Agricultural Economics* (1982):232-41.

7 For more details on these issues, see G. McG. Sloan, *Report of the Commissioner Relating to the Forest Resources of British Columbia, 1956*, vols. 1 and 2 (Victoria: Queen's Printer, 1957); Pearse, *Timber Rights*; Copithorne, *Natural Resources*; Pearse, *The Forest Industries of British Columbia*; and D. Haley, "A Regional Comparison of Stumpage Values in British Columbia and the United States Pacific Northwest," *Forestry Chronicle* 56, no. 5 (October 1980):225-30.

8 Reed and Associates, "Recent Reductions."

9 B.C. Ministry of Forests, *Forest and Range Resource Analysis Technical Report*, vol. 2, Chapter 17.

10 In a submission to the B.C. Energy Commission's 1980 natural gas price inquiry, the Council of Forest Industries forecast (p. 15) that timber production over the period 1995-2000 will be between 86 and 88 million cubic metres per year, after "taking both supply and demand projections into account." This forecast is between 3 and 5 million cubic metres less than the "most likely" estimate of timber demand forecast by the Ministry of Forests. Other projections are far less optimistic. Data Resources Incorporated has forecast – see *FORSIM Review* 13, no. 2 (June 1982), pp. 161-62 – that lumber production in British Columbia will not again reach the peak level of 12.5 billion board feet attained in 1978 and that it will amount to only 9.5 billion board feet in 1995. The province's share in Canadian lumber production is projected to decline from 68 per cent in 1978 to only 49 per cent in 1995. A combination of increasing timber supply constraints, rising production and plant and equipment costs in British Columbia, and forecasts of slower growth in the demand for lumber in the United States account for the relative pessimism of this scenario.

11 Food and Agriculture Organization of the United Nations, "Review of Long-Term Trends and Prospects for the Forest and Forest Products Sector in Selected Countries Outside Europe," Geneva, November 1981, p. 19.

12 Adams *et al.*, "Long-Term Supply of Timber."

13 Canadian Softwood Lumber Committee, "Consolidation of Material Presented to the International Trade Commission Regarding Enquiry into Importation of Canadian Softwood Lumber," February 1982, p. 21.

14 The choice of the "present net worth" criterion involves choosing a rotation age that maximizes the value of the standing timber (the "stumpage") over *one* rotation. The stumpage is the residual return to land after deducting from an appropriate end-product price (such as that of logs or lumber) the payment to capital and labour employed in harvesting and processing the timber. That residual value represents the "economic rent" accruing to the resource base. The "soil expectation" measure is more comprehensive and yields the rotation age that maximizes the value of stumpage over an *infinite* sequence of harvests. For high discount rates or for long rotation periods, the differences between the two measures are often minimal.

15 S. Calish, R. D. Fight, and D. E. Teeguarden, "How Do Nontimber Values Affect Douglas-Fir Rotations?" *Journal of Forestry* 56 (April 1978):217-21.

16 D. Haley, "Factors Influencing the Financial Rotation of Douglas Fir in Coastal British Columbia," unpublished paper, University of British Columbia, Faculty of Forestry, Vancouver, 1963; H. G. Smith and D. Haley, "Allowable Cuts Can Be Increased Safely by Use of Financial Rotation," *British Columbia Lumberman* 48 (June 1964):26-28.

17 P. H. Pearse found that the rotation leading to a maximum soil expectation value of $5.53 per acre was 56 years; see "The Optimum Forest Rotation," *Forestry Chronicle* 43 (June 1967):186. The rotation period consistent with the maximum sustained yield from the site was 103 years and reduced the soil expectation value to $0.88 per acre. The adoption of the fiscal criteria led to an 84 per cent decline in the value of the timber site to society. Calish *et al.* found that the rotation period that maximized the soil expectation value at $643 per acre was 36 years. When the maximum-sustained-yield criterion was applied, the rotation period increased to 64 years and the soil expectation value fell to $329 per acre. The cost of adopting a physical rather than an economic criterion for choosing a rotation period using the Calish *et al.* data is $314 per acre. It should be borne in mind that comparisons of stumpage values between studies is misleading, as differences arise from the use of different discount rates, end-product prices, and timber site quality.

18 Recent results obtained by Heaps in "Present Value of Stumpage" suggest, however, that for some (poorer quality) sites and some forest management regimes, there is no significant difference between physical and economic rotation periods.

19 H. V. Lewis, "Objectives of Public Forest Policy in British Columbia: Some Economic Observations," in W. McKillop and W. J. Mead, eds., *Timber Policy Issues in British Columbia* (Vancouver: British Columbia Institute for Economic Policy Analysis, 1976), p. 10.

20 Government of Canada, "A Forest Sector Strategy," p. 13.

21 The discussion that follows is based largely on Percy, "The Forest Industry." He shows that the first two options mentioned here are not very promising.

22 Government of Canada, "A Forest Sector Strategy," p. 15.

23 See, for example, J.H.G. Smith, "Management of Douglas-Fir and Other Forest Types in the Vancouver Public Sustained Yield Unit," case study no. 4, in Reed and Associates, *Forest Management in Canada*, vol. 2, pp. 4-1 to 4-58.

24 Heaps, "Present Value of Stumpage."

25 The basic procedure consists in starting with an end-product price – on the coast, the price of logs sold in the Vancouver log market; and, in the interior, the price of lumber and chips – and subtracting from it the costs of the productive inputs required to harvest and transport the timber. The residual is the value of stumpage.

26 Percy, "The Forest Industry."

27 British Columbia, Task Force on Crown Timber Disposal, *Timber Appraisal: Policies and Procedures for Evaluating Crown Timber in British Columbia*, second report (Victoria: July 1974), Chapter 7.

28 B.C. Task Force, *Timber Appraisal*.

CHAPTER 6

1 R. S. Uhler with P. C. Eglington, "The Potential Supply of Crude Oil and Natural Gas Reserves in the Alberta Basin," Economic Council of Canada (forthcoming), Appendix A.

2 J. L. Lloyd-Price and P. M. Doherty, *Alberta's Vanishing Gas Surplus, 1983-1986*, Daly Gordon Securities Basic Industry Study, October 1983.

3 R. M. Procter, G. C. Taylor, and J. A. Wade, *Oil and Natural Gas Resources of Canada, 1983*, Energy, Mines and Resources Canada, Geological Survey Paper 83-31 (Ottawa: EMR, 1984).

4 Energy, Mines and Resources Canada, *Long Term Energy Supply Demand Outlook: Summer '83 Forecast* (Ottawa: EMR, July 1983), p. 24; National Energy Board, *Canadian Energy: Supply and Demand 1980-2000* (Ottawa: NEB, June 1981), p. 147, Modified Base Case; and Alberta, Energy Research Conservation Board, *Alberta Oil Supply 1983-2007*, ERCB Report 83-E (December 1983), p. 34.

5 J. Jobin, "The Supply of Oil and Natural Gas Discoveries in Alberta," Economic Council of Canada, Discussion Paper 249, December 1983.

6 Energy, Mines and Resources Canada, *Energy Supply Demand Outlook*, p. 23.

7 Energy Research Conservation Board, *Alberta Oil Supply*, p. 26.

8 T. Hazledine, S. Guiton, L. Froehlich, and P. Mercier, "OPEC and the Value of Canada's Energy Resources: A Long-Range Simulation Model," Economic Council of Canada, Discussion Paper 253, May 1984, pp. 106-26.

9 National Energy Board, *Gas Export Omnibus Hearing* (Ottawa: NEB, January 1983), p. 85.

10 Uhler and Eglington, "Crude Oil and Natural Gas Reserves," p. 117.

11 Compare National Energy Board's *Canadian Energy*, pp. 154-55, with the same organization's *Gas Export Omnibus Hearing*, pp. 15 and 18.

12 Energy Research Conservation Board, *Alberta Oil Supply*, p. 9.

13 This section is based on T. T. Schweitzer, "Migration and a Small Long-Term Econometric Model of Alberta," Economic Council of Canada, Discussion Paper 221, December 1982; and Schweitzer, "The Alberta Economy, 1980-2000: Theme and Variations," Economic Council of Canada, Discussion Paper 246, November 1983. The main outlook described in the chapter is the "optimistic scenario" of the model discussed in the latter of these two discussion papers.

14 K. H. Norrie and M. B. Percy, "Economic Rents, Province-Building and Interregional Adjustment: A Two-Region General Equilibrium Analysis," Economic Council of Canada, Discussion Paper 230, April 1983.

15 This discusssion is based on Hazledine *et al.*, "Value of Canada's Energy Resources"; and Schweitzer, "The Alberta Economy, 1980-2000," pp. 27-37.

CHAPTER 7

1 For those interested in the intricacies of our calculations and for more detailed results, see Jacques Jobin, "L'instabilité des revenus agricoles dans les Prairies," Economic Council of Canada (forthcoming).

2 This section is based upon a report prepared for the Economic Council by R.M.A. Loyns and Colin A. Carter, entitled "Grains in Western Canadian Economic Development to 1990" (forthcoming).

3 See Loyns and Carter, "Grains," Section III.

4 G. R. McGlaughlin, Assistant Corporate Secretary to the Saskatchewan Wheat Pool, estimated that expenses per acre in Saskatchewan increased by 84 per cent, in real terms, between 1962 and 1982. According to his calculations, net return per acre was no higher than in 1967 and actually lower than in the early 1970s. See McGlaughlin's address to the Canadian Plains Research Centre Conference, January 12, 1984.

5 S. Borland and G. Robertson, "A Sectoral View of the Longer Term: Agriculture," Agriculture Canada, prepared for the seminar on long-term prospects sponsored by the Macdonald Royal Commission, Ottawa, January 10, 1984.

6 Loyns and Carter, "Grains," Section III.

7 We note that the Western Grain Research Foundation has just allocated its first $600,000 (out of $900,000) to production research, because it does not wish to duplicate the market research going on elsewhere. There is considerable controversy about the proposed federal legislation with respect to plant breeders' rights and their impact on private-sector funding of research and development on varieties. See R.M.A. Loyns and A. J. Begleiter, *An Examination of the Potential Economic Impact of Plant Breeder Rights in Canada*, Report to Consumer and Corporate Affairs, Canada, June 1982.

8 For a description of past international accords and Canada's interest in their renewal, see A. Ellison, "The Canadian Interest in an International Wheat Agreement," Economic Council of Canada, Discussion Paper 167, 1980; also, Loyns and Carter, "Grains," Section VI.

9 "Countertrade, simply defined, is the term applied to transactions in which the importer (purchaser) in

international trade requires a reciprocal purchase by the exporter. Types of transactions include pure barter arrangements, bilateral clearing accounts, switch trading and compensation (or buy-back), but reciprocal sales and counterpurchase arrangements are the more common forms of countertrade." See David Goldfield, "Countertrade," in *International Perspectives* (March/April 1984), pp. 19-22.

10 Loyns and Carter, "Grains," contains a general description of the regulatory framework; see also D. R. Harvey. "Government Intervention and Regulation in the Canadian Grains Industry," Economic Council of Canada, Technical Report E/I 6, Ottawa, June 1981.

11 This section is based on W. A. Kerr and S. M. Ulmer, "The Importance of the Livestock and Meat Processing Industries to Western Growth," Economic Council of Canada, Discussion Paper 255, 1984.

CHAPTER 8

1 The term "reserves" refers to that portion of the resource base of a mineral that is known to exist with greatest confidence and is available for production at current market prices.

2 The provincial revenues reported above included only those derived from the industries, particularly because they are *mineral* industries. All other revenues that accrue to the province or the federal government through the income tax system or to municipalities through property taxes are not included. Those taxes would apply for any industry and are therefore not included here as revenues associated with natural resources.

3 The choice of the manufacturing price index as a basis for comparison of the relative price trends is premised on the fact that the West, on balance, imports more highly processed goods and exports primary goods. An increasing relative price for the goods that the West exports indicates that the purchasing power of the West is increasing in terms of the imports that it can finance with its exports. In other words, increasing relative prices indicate real income gains.

4 David L. Anderson, "The Saskatchewan Potash Industry: Alternative Strategies for Future Development," Economic Council of Canada, Discussion Paper 264, 1984; Harry F. Campbell, "Exhaustible Resources and Economic Growth: The Case of Uranium Mining in Saskatchewan," Economic Council of Canada, mimeo.; and Brenda J. Dyack, "Western Canada's Coal Industry: Status and Potential," Economic Council of Canada (in preparation).

5 This section is mainly based on Anderson, "The Saskatchewan Potash Industry."

6 The next largest reserve base is in the Soviet Union, but it is estimated to be only 20 per cent of the Canadian reserve base. Information on cost levels there is not very good.

7 Moreover, if past rates of real price increases (about 3 per cent per annum over the last decade) were assumed in the current forecasts of supply and demand, the same excess supply problem will persist and similarly yield a poor outlook for price increases.

8 In other areas or countries the minimum price needed to elicit new capacity is expected to be higher.

9 This structure is an oligopoly.

10 It is important to note also that potash is a homogeneous good and therefore producers cannot hide price-cutting behaviour by offering a slightly different product at a lower price.

11 Saudi Arabia typically assumes this role in the oil cartel.

12 See Anderson, "The Saskatchewan Potash Industry," for a discussion of the responsiveness of demand to price changes in both the U.S. and offshore markets.

13 These prices refer to the average value of sales by Saskatchewan producers, in dollars per kilogram of uranium metal. Dividing this price by 2.6 gives the price in dollars per pound of U_3O_8 – yellow cake.

14 The geological categories referred to here are the economic resources in the "reasonably assured" category and the economic resources called "estimated additional." Economic resources are those thought to be exploitable at prices (or costs) up to the current market level.

15 The open-pit mining methods that are used in Saskatchewan are relatively more capital-intensive than underground methods and result in lower average costs, as well as greater flexibility.

16 Following legal investigations in both the United States and Canada, there have been no admissions of guilt or convictions; therefore the composition of the cartel and its workings, as described here, are based on common knowledge rather than proven fact. Much secrecy has surrounded the whole affair.

17 See Organisation for Economic Co-operation and Development, *Uranium Resources, Production and Demand* (Paris: OECD, February 1982). Growth in capacity from 5.3 to 30.8 GW(e) implies a change of 25.5 GW(e) and a percentage change of 481 per cent in LDCs, while the overall growth in non-centrally planned countries from 165.1 to 424.0 GW(e) implies a greater change of 258.9 GW(e) and a smaller percentage growth of 157 per cent.

18 R. W. Morrison (Director General), "Canada's Role as a Uranium Supplier," Energy Mines and Resources Canada, Uranium and Nuclear Energy Branch, Address to the Fourth Pacific Basin Conference, Vancouver, B.C., September 13, 1983.

Many other estimates exist, and some of these are presented in a background paper to this document; see, for example, *Uranium Resources*, where the OECD estimates that uranium supply and demand by 1990 will be between 53,000 and 64,000 tonnes per annum.

19 Spot market prices in late 1983 were $62/kgU (U.S.) compared with average prices in long-term contracts of about $91/kgU (U.S.).

20 In 1981, 10 per cent of Saskatchewan's sales revenues came from Sweden.

21 The current administration in Australia was against uranium developments for environmental reasons

before it was elected. If Australian reserves were removed from possible production, the total world reserves available at lowest costs and greatest confidence would fall by 17 per cent.

22 Note that the *world* price is highly influenced by the relatively large U.S. market.

23 Address by Dr. Roger J. Goodman, Crows-Nest Resources, to the CIE/CIM Coal Symposium, Calgary, Alberta, May 1983.

24 Carroll L. Wilson, *World Coal Study: Coal – Bridge to the Future* (Cambridge, Mass.: Ballinger, 1980), p. 161.

25 For a discussion of the issues, see Australia Foreign Investment Review Board, *1981 Report* (Canberra: Australian Government Publishing Service, 1982), Chapter 5.

26 Province of British Columbia and the federal Department of Regional Economic Development, *A Benefit-Cost Analysis of the North East Coal Development*, July 1982.

CHAPTER 9

1 Peter H. Pearse (Commissioner), *Turning the Tide: A New Policy for Canada's Pacific Fisheries*, Final Report of the Commission on Pacific Fisheries Policy (Vancouver: September 1982), p. vii.

2 Economic Council of Canada, *Reforming Regulation* (Ottawa: Supply and Services Canada, 1981); and A. Scott and P. A. Neher, eds., *The Public Regulation of Commercial Fisheries in Canada*, Economic Council of Canada (Ottawa: Supply and Services Canada, 1981).

3 Data on expenditures for tourism and travel in Canada by U.S. and overseas visitors are available from the early 1970s to 1980; however, 1979 is the first full year for which they are available on Canadians travelling in Canada. When compared with gross output figures for other industries, a rough measure of the relative importance of the tourism/travel industry is provided. This measure is an overestimate of the tourist industry proper because it includes a lot of strictly local travel. Nevertheless, the comparison seems worthwhile. Industrially disaggregated gross output data are available for the goods-producing industries but not for the other service industries.

4 Unless *within-province* travel is a major substitute for holidays abroad or outside the West by residents. This seems unlikely.

5 This section is based on T. S. Veeman, "Water and Economic Growth in Western Canada," Economic Council of Canada (forthcoming).

6 H. D. Foster and W.R.D. Sewell, *Water: The Emerging Crisis in Canada*, Canadian Institute for Economic Policy (Ottawa: CIEP, 1981), p. 15.

7 Okanagan Basin Implementation Board, *Summary Report on the Okanagan Basin Implementation Agreement*, September 1982.

8 Public Advisory Committee, *Preliminary Economic Study*, Milk River Basin Study, Fact Sheet No. 9, (Lethbridge: Alberta Environment, 1981).

9 Veeman, "Water and Economic Growth."

10 Veeman, "Water and Economic Growth."

11 M. M. Kelso, W. E. Martin, and L. E. Mack, *Water Supplies and Economic Growth in an Arid Environment: An Arizona Case Study* (Tucson: The University of Arizona Press, 1973); and A. V. Kneese and F. L. Brown, *The South-West Under Stress*, published for Resources for the Future (Baltimore: Johns Hopkins University Press, 1981).

12 D. M. Tate and P. J. Reynolds, "Meeting the Demand for Industrial Water: Intermediate Water Transfers," a paper presented at the Canadian Water Resources Association Conference, Saskatoon, June 21-23, 1983.

CHAPTER 10

1 Adam Smith, *Wealth of Nations*, Book I, Chapters 1-3.

2 Dominion Bureau of Statistics, *Census of Canada, 1951*, vol. 1, Table 1.

3 H. Darling, *The Politics of Freight Rates: The Railway Freight Rate Issue in Canada* (Toronto: McClelland and Stewart, 1980), p. 14.

4 Darling, *The Politics of Freight Rates*, p. 18.

5 Gross domestic product (GDP) is a concept that differs in some technical details from the more familiar gross national product (GNP). Statistics Canada finds it more convenient to estimate the output of individual industries and of provinces in GDP rather than GNP terms.

6 The transportation intensities for western and eastern Canada are based on provincial and industrial real domestic product (RDP) data estimated by the Conference Board of Canada in *The Provincial Economies: A Supplement to the Quarterly Provincial Forecast*. Real domestic product is estimated by adjusting gross domestic product for price changes. The Conference Board's definition of the transportation industry differs from that of Statistics Canada in that their concept covers air, rail, water, trucking, and pipeline transportation but excludes buses, urban transit, taxis, highway and bridge maintenance, and miscellaneous transportation services, while the Statistics Canada concept includes all of these items.

7 N. Skoulas, *Transport Costs and Their Implications for Price Competitiveness in Canadian Goods-Producing Industries*, Consumer and Corporate Affairs Canada, Research Monograph Number 9, 1981.

8 D. L. McLachlan and C. Ozol, *Transportation Problems Relating to the Manufacturing Industry in the Calgary Area*, Canadian Transport Commission Research Publication, May 1973, p. 50. Complaints therein included: extremely slow action by the railways on any problems; uneven servicing of firms, with cars arriving bunched; and type of cars provided.

9 H. L. Purdy, *Transport Competition and Public Policy in Canada* (Vancouver: University of British Columbia Press, 1972), p. 247.

10 For example, P. A. Samuelson and A. Scott, *Economics*, 3rd Canadian edition (Toronto: McGraw-Hill of Canada, 1971).

11 Canadian Transport Commission, *Commodity Flow Analysis, 1978-80*, Reference Paper No. 1.6 (Ottawa: CTC, 1982), Table 66.

12 C. Snavely, *Report of the Commission on the Cost of Transporting Grain by Rail* (Ottawa: Supply and Services Canada, 1976 to 1979), pp. 212-14.

13 The experts disagreed on the technical details of calculating the exact size of the revenue shortfall but agreed that the loss was big and growing. The main area of disagreement was the cost of capital and the magnitude of business risk in transporting grain. Cf. J. C. Gilson: *Western Grain Transportation: Report on Consultation and Recommendations* (Ottawa: Supply and Services Canada, 1982), p. V-9; R. L. Banks and Associates Inc., *Critique of 1980 Costs and Revenues Incurred by the Railways in the Transportation of Grain under the Statutory Rates*, House of Commons, Minutes of Proceedings of the Standing Committee on Transport, Issue 110, August 4, 1983, pp. 110A; 131-180; Travacon Research Ltd., *Submission of Alberta Wheat Pool, Manitoba Pool Elevators, and Saskatchewan Wheat Pool to the Western Grain Transportation Task Force*, Issue 120, August 23, 1983, pp. 120A; 1-19; and Snavely, King & Associates Inc., *Equitable Allocation of Compensatory Grain Compensation between CN Rail and CP Rail*, Issue 120, pp. 120A; 20-45.

14 Department of Transport, Press Communiqué, February 1, 1983.

15 Senate of Canada. Proceedings of the Special Committee on Transport and Communication, September 28, 1983. Testimony of K. Thompson, Senior Counsel of CTC, pp. 10-11 and of A. Kroeger, Secretary of Ministry of State for Economic Development, p. 27.

16 J. C. Stabler, *Transportation and Prairie Communities*, Canadian Transport Commission, Research Publication, June 1973.

17 G. Mason, *Survey of Methodology and Preliminary Estimates of Fiscal Incidence Associated with the Diversion of Traffic from Rail to Road in Manitoba*, a study prepared for the Economic Council of Canada (Winnipeg: University of Manitoba, Institute for Social and Economic Research, 1983), and T. T. Schweitzer, "Railway Freight Rates and Western Economic Development," Economic Council of Canada (forthcoming).

18 Statistics Canada, *Provincial Government Finance*, Cat. 68-207, 1981, Table 2.

19 G. W. Wilson and L. Darby, *Transportation on the Prairies*, a study prepared for the Royal Commission on Consumer Problems and Inflation (Ottawa: 1968), p. 43.

20 Transport Canada, "Canadian Freight Transportation System Performance and Issues," a discussion paper, August 1981, pp. 56-57.

21 D. W. Gillen and T. H. Oum, "Railways in Western Canada: Bottlenecks, Capacity Expansion and Financing," Economic Council of Canada (forthcoming), Table 5.

22 Letters from J. Maurice LeClair, President and Chief Executive Officer, CNR, and from W. W. Stinson, President, CPR to the Honourable Jean-Luc Pepin, Minister of Transport, 28 January 1983, included in a federal government press release, February 1983.

23 Western Economic Opportunities Conference (1973), *Verbatim Record and Documents* (Ottawa: Supply and Services Canada, 1977), pp. 23, 32, and 67.

24 P. S. Ross and Partners, *et al.*, *Two Proposals for Rail Freight Pricing: Assessment of Their Perspective Impact*, a report to the Federal-Provincial Committee on Western Transportation, September 30, 1974.

25 For a summary of the calculation of relevant transport charges, see Schweitzer, "Railway Freight Rates."

26 An alternative proposal submitted by the Manitoba government – the Destination Rate Level (DRL) scheme – would have cost only about one-third as much as the EPP scheme. It would have resulted in a deterioration of the West's competitive position, however.

27 W. J. Baumol and D. F. Bradford, "Optimal Departures from Marginal Cost Pricing," *American Economic Review* 60, no. 3 (June 1970):265-83. Indeed, freight rates under rate-setting freedom approximate those required by optimal efficiency.

28 P. S. Ross *et al.*, *Roadbed Costs and Cost Relief Options for Canada's Contiguous Railways*, a report to the Federal-Provincial Committee on Western Transportation, March 14, 1975.

29 Transport Canada, *Transport Costs and Revenues in Canada, 1969-1979*, (Ottawa: July 1982), pp. 45-48.

30 D. W. Caves and L. R. Christensen, *Productivity in Canadian Railroads, 1956-1975*, Canadian Transport Commission Research Report 10-78-16 (Ottawa; CTC, 1978), p. 57. The productivity concept used in this study is that of "total factor productivity."

31 P. S. Rao and R. S. Preston, "Inter-factor Substitution and Total Factor Productivity Growth: Evidence from Canadian Industries," Economic Council of Canada, Discussion Paper 242, September 1983.

32 A. Kylmchuk, *Private Trucking: Analysis and Implication*, Department of Consumer and Corporate Affairs (Ottawa: 1983), p. 55.

33 Economic Council of Canada, *Reforming Regulation* (Ottawa: Supply and Services Canada, 1981), pp. 22-23.

34 W. G. Waters II, "Transportation, Transport Policies and the Future Development of Western Canada," Economic Council of Canada, Discussion Paper 234, August 1983, pp. 62-63.

35 T. D. Heaver, *National Flag Shipping: An Analysis of Canadian Policy Proposals*, Centre for Transportation Studies (Vancouver: University of British Columbia, 1982), Chapter V.

36 B. C. Baldwin, *The Management Structure of Airport Operations in Canada and the United States*, UBC Centre for Transportation Studies, 1980, pp. 14-15, quoted from J. Smith, "Considerations in Local Administration of Airports in Canada," *Annals of Air and Space Law* (1978).

CHAPTER 11

1 D. L. Birch, *The Job Generation Process*, and *Choosing a Place to Grow: Business Location Decisions in the 1970's*, The M.I.T. Program on Neighbourhood and Regional Change, (Cambridge, Mass.: M.I.T. Press, 1979 and 1981, respectively). The data used in Birch's analyses were taken from Dunn and Bradstreet files. There are some problems with these data. Two important ones are that the file tends to contain a lower percentage of service and trade firms than of manufacturing firms; it also tends to underreport births of new firms during any particular interval. Birch developed an algorithm to compensate for many of the biases introduced by lags in reporting intervals.

2 Canadian Federation of Independent Business, "A Full-Employment Future," a presentation to the Royal Commission on the Economic Union and Development Prospects for Canada, December 1983. The results of the study apply only to the members of the CFIB. The membership does not necessarily represent a random sample of small and medium-sized businesses in Canada.

3 H. H. Postner and L. Wesa, *Canadian Productivity Growth: An Alternative (Input-Output) Analysis*, Economic Council of Canada (Ottawa: Supply and Services Canada, 1983).

4 Postner and Wesa, *Canadian Productivity Growth*.

5 J. I. Gershuny, "Social Innovation: Change in the Mode of Provision of Services," *Futures* 14, no. 6 (December 1982):496-516.

6 T. M. Stanbach, *Understanding the Service Economy – Employment, Productivity, Location*, Policy Studies in Employment and Welfare, No. 35 (Baltimore: Johns Hopkins University Press, 1979).

7 Economic Council of Canada, *The Bottom Line: Technology, Trade, and Income Growth* (Ottawa: Supply and Services Canada, 1983).

8 The formal model upon which this answer is based is available upon request. It is of a two-commodity (one tradable, one nontradable), small, open economy, with endogenous money supply and neutral technical change in each sector. Assume for the moment that there is no technical change or inflation outside the region. If technical change proceeds in such an economy, at a rate that is equal in both sectors, it is possible to show for a special, though possibly not too unrealistic, case that money wages will rise at the same rate as technical change, permitting the price of tradables to remain steady. The price of nontradables will also remain steady. The output of both tradables and nontradables rises at the rate of technical change. It can also be shown that the money supply accommodates this. The important points are that: 1) neither downward wage flexibility nor downward price flexibility is required; and 2) monetary stringency is not a problem. These "Keynesian" problems do not arise essentially because the economy is small and open to trade. In a closed economy, technical change that is neutral and across the board requires either downward wage flexibility or, if wages are rigid, monetary expansion, to avoid unemployment.

   If technical change in a small, open economy is confined to the nontradable sector, it seems likely that downward changes in money wages will be needed, and a downward movement of nontradable prices certainly will be. These requirements for wage and price flexibility appear to be rather stringent; hence the risk of this kind of technical change causing unemployment would appear quite large were it not for one fact – namely, that our assumption of no inflation outside the region is usually false. Substantial inflation of wages and prices outside the region is the norm. Such general inflation converts any requirement for falling money wages inside the region into a requirement that wages not rise as rapidly as outside the region. Similarly, nontradable prices need not fall but simply rise less rapidly than outside the region. That degree of "flexibility" seems plausible – hence the applicability of neoclassical theory and the statements in the text.

   The above reasoning becomes more complicated if technical change is proceeding outside the region as well as inside it, but nothing essential is altered. In particular, full employment still requires that wages and prices of nontradables be able to rise somewhat more slowly than outside the region for as long as productivity in the region's goods industry is rising more slowly than outside and productivity in the service industry is rising faster.

   In sum, a small, open economy behaves neoclassically because the downward flexibility of money wages and of prices is not required in a region embedded in a world of general inflation.

9 Organisation for Economic Co-operation and Development, *Microelectronics, Robotics and Jobs* (Paris: OECD, 1982).

10 J. Gottman, "Urban Centrality and the Interweaving of Quarternary Activities," *Ekistics* 29, no. 174 (May 1970).

11 Gottman, "Urban Centrality."

12 Ministry of State for Economic Development, *ABC: Assistance to Business in Canada, 1981-82* (Ottawa: Supply and Services Canada, 1981).

13 Economic Council, *The Bottom Line*.

CHAPTER 12

1 W. Isard, *Location and Space-Economy* (Cambridge, Mass.: M.I.T. Press, 1956).

2 H. W. Richardson, *The Economics of Urban Size* (Farnborough: Saxon House, 1973).

3 See, for example, G. A. Carlino, *Economies of Scale in Manufacturing Location* (Boston: Martinus Nijhoff, 1978); R. L. Moomaw, "Is Population Scale a Worthless Surrogate for Business Agglomeration Economies?", *Regional Science and Urban Economics* 13(1983):525-45; and P. M. Townroe and N. J. Roberts, *Local-External Economies for British Manufacturing Industries* (London: Gower, 1980).

4 M. Urquhart, "The Service Industry: Is It Recession-Proof?" *Monthly Labour Review* 104, no. 10 (1981):12-18.

5 The location quotient measures the extent to which a city (or region) has more or less of a given activity than expected. The expected level of activity is commonly taken as the size of the city – its population – relative to the national population, although other base measures such as output or employment are also used. If employment in a given industry in a city as a proportion of national employment is equal to the ratio of city population to national population, then the level of activity in that city is at its expected level. If the quotient is greater than 1, the city is relatively specialized in that industry; if the quotient is less than 1, the city has less of that industry than expected.

6 Although the factor analysis illustrated relates to the wholesale industry, the results for each of the other industries are basically identical. Some minor variations result from differences in the composition of the city samples.

7 Although it is preferable for the total number of establishments to include both service and manufacturing establishments, sufficient data were not available at the city level to include the number of manufacturing establishments. As a result, these data refer only to the total number of service-industry establishments.

8 See, for example, G. A. Carlino, *Economies of Scale*, 1978.

9 The estimated coefficients for each of the service and manufacturing industries are given in Appendix Tables D-1 and D-2. The best results were obtained for the retail industry, in which case 57 per cent of the variation was explained. The results for the other industries were as follows: personal services, 33 per cent; wholesale trade, 29 per cent; services to business management, 23 per cent; accommodation and food services, 18 per cent; and amusement and recreation services, 5 per cent. These percentages, though not remarkably high except for the retail industry, are quite acceptable and normal given that the data are cross-sectional. Also, we note that agglomeration economies are not the *only* factor affecting industry efficiency. For example, in the case of amusement and recreation, locational factors such as access to environmental amenities and the consequent attraction of large volumes of tourist business may well be an extremely important factor, though one not included in our analysis of the role played by agglomeration economies. The results reported here, by industry, are for the case where all CAs and CMAs for which data were available were included in the regression analysis, a number that is much smaller than the total number of CAs and CMAs.

10 The average is so small because of the nature of the available Statistics Canada data used in the analysis. The service-industry data used refer to locations and include operations ranging from shops and stores to open-air stalls and kiosks. Each location consists exclusively of the industry for which data were collected. For example, a single operation involved in both retail and wholesale trade would be counted as two locations – one for the retail trade portion and one for the wholesale trade portion. Location data differ from establishment data, which are the more common reporting unit used in the manufacturing industries. A single establishment, for instance, may be involved in a number of industry activities; hence establishments tend to be larger. An important drawback of the location data is that they exclude businesses that operate in a number of cities. For the most part, multi-city businesses were unable to provide data on gross trading margins separately for each of their locations. Thus the units in our analysis consist of only single-location businesses, excluding the typically larger chains such as The Bay, Sears, Eaton, and so on.

11 See W. Alonso, "The Economics of Urban Size," *Papers of the Regional Science Association* (1971), pp. 67-83.

12 Economic Council of Canada, *The Bottom Line: Technology, Trade, and Income Growth* (Ottawa: Supply and Services Canada, 1983).

13 M. J. Webber, *The Impact of Uncertainty on Location* (Cambridge, Mass.: M.I.T. Press, 1972).

CHAPTER 13

1 K. Norrie and M. Percy, "Economic Rents, Province-Building and Interregional Adjustment: A Two-Region General Equilibrium Analysis," Economic Council of Canada, Discussion Paper 230, 1983.

2 See Roy E. George, *Targeting High Growth Industry* (Montreal: Institute for Research on Public Policy, 1983).

3 See N. Cameron, J. Dean and W. Good, "The Manufacturing Sector in Manitoba," Economic Council of Canada, Discussion Paper 254, 1984.

4 See M. Casson, *The Entrepreneur: An Economic Theory* (New York: Harper and Row, 1982).

5 The special issue of *Canadian Public Policy* (February 1980) on the Alberta Heritage Fund is completely out of date, particularly with respect to predictions concerning the Fund's assets by the mid-1980s.

6 Some of these unfortunate experiences are described in J. Richards and L. Pratt, *Prairie Capitalism: Power and Influence in the New West* (Toronto: McClelland and Stewart, 1979).

7 Vencap is not required to repay the principal to the Alberta Heritage Fund until 2002! Interest on the principal is tied to any net earnings (50 per cent of net earnings and declining).

8 See H. Postner and L. Wesa, "Industrial Diversification in Western Canada: A Portfolio Analysis of the Manufacturing Sectors," Economic Council of Canada (forthcoming).

APPENDIX E

1 There is a serious break in the statistical time series that disallows the analysis of a longer time period.

2 All data used to calculate the indexes in Table E-1 are "rounded" to the nearest "thousand" – eliminating the possibility of detailed analysis for the four western provinces.

3 In the supporting technical document by Postner and Wesa, "Industrial Diversification," some experimental instability indexes embodying agriculture show that Saskatchewan is the most unstable province.

4 The weights are expressed in percentage terms and add up to 100 per cent.

5 The supporting technical document will contain similar tables for Quebec and Ontario, where the manufacturing employment weights are the largest.

6 This result is dependent, to some extent, on the employment coverage of the larger-firm survey.

7 The employment data again come from a survey of larger firms (those having at least 20 employees). The total employment coverage runs from 77 per cent for Saskatchewan to 89 per cent for Manitoba. The "missing" data represent employees in smaller firms, the self-employed, and unpaid family workers (if any).

8 The food and beverage industry is affected by perishability factors, and the printing and publishing industry often caters to regional information requirements.

9 The arguments supporting this assumption can be found in the technical document.

10 An example of how results can differ when manufacturing is analysed "in isolation" is given in the technical document.

11 In all cases to follow, the forestry sector is constrained to "no change" for purely technical reasons.

12 Some of the results tend to be "counterintuitive" because of the complex nature of the interdependencies.

13 We have only shown the impact on employment redistribution. Such redistribution can occur either in a static or dynamic growth context.

14 The link between the two goals is affected by the fact that long-term provincial employment growth is a weighted average of disaggregated employment growth rates, with the weights being identical to those used to redistribute employment in the optimization exercise aimed at minimizing instability (see supporting technical document).

15 The effective shadow price of the additional constraint is close to zero.

16 Interestingly enough, a particular constraint that is not binding may become binding with the addition of another constraint (see Table E-14, line 4).

17 Perfect stability is desirable but not necessarily ideal (negative-correlation industries best promote stability).

18 This will be demonstrated in special scenarios run in the technical document.

19 Some examples illustrating this proposition are contained in the forthcoming technical document.

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